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U. S. DEPARTMENT OF AGRICULTURE,  
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JOHN HYDE, Statistician.

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# INTERNATIONAL SUGAR SITUATION.

ORIGIN OF THE SUGAR PROBLEM AND ITS PRESENT ASPECTS  
UNDER THE BRUSSELS CONVENTION.

BY

FRANK R. RUTTER,  
ASSISTANT CHIEF, DIVISION OF FOREIGN MARKETS.



WASHINGTON:  
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1904.

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U. S. DEPARTMENT OF AGRICULTURE,  
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JOHN HYDE, Statistician.

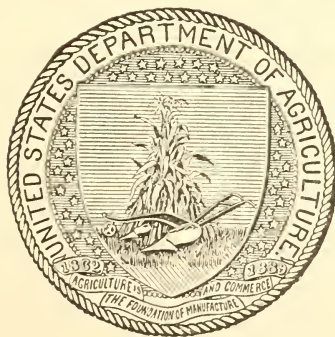
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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF STATISTICS,  
*Washington, D. C., September 28, 1904.*

SIR: I have the honor to transmit herewith a report on the International Sugar Situation, submitted from the Division of Foreign Markets, the publication of which, as Bulletin No. 30 of this Bureau, is respectfully recommended. The five illustrations accompanying the report are essential to a clear understanding of the subject dealt with.

Respectfully,

JOHN HYDE,  
*Statistician and Chief of Bureau.*

Hon. JAMES WILSON,  
*Secretary of Agriculture.*



## PREFATORY NOTE.

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One year ago the sugar régime in Europe underwent radical change. The sugar legislation, originally drafted to safeguard the beginnings of the industry, then modified so as to encourage improved methods of culture and manufacture, and finally including direct or indirect bounties on production or exportation, had resulted in general overproduction of sugar, the surplus being marketed abroad at low prices under the stimulus of the bounties. This result, most conspicuous in the foreign trade, seemed to require an international remedy. In the Brussels Conference of 1901-2, the principal sugar-producing countries of Europe, with the exception of Russia, reached an agreement by which all export bounties, special advantages, and exemptions from tax should be abolished. The new laws went into effect September 1, 1903. Preliminary returns, showing the results of the first year under the Brussels Convention, are now available for the principal countries, and render possible for the first time a detailed comparison between the purposes and the actual effects of the new legislation.

This report on the International Sugar Situation was prepared by F. R. Rutter, Assistant Chief of the Division of Foreign Markets, to answer the need for a short yet comprehensive presentation of the more important facts influencing the production of cane and beet sugar in the chief producing countries and bearing upon the problems of international competition. The published matter upon the subject is either not comprehensive or, if so, loses the reader in mazes of detail, perhaps assembled without logical plan.

It is hoped that this bulletin will supply the need mentioned and enable the reader to understand the subject in its important features without having to extract essential elements from voluminous matter.

GEORGE K. HOLMES,  
*Chief of Division of Foreign Markets.*

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# INTERNATIONAL SUGAR SITUATION.

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## INTRODUCTION.

The international sugar situation to-day offers a striking contrast to that of fifty years ago. During the last half century a marvelous growth of the European beet-sugar industry has taken place. At the middle of the nineteenth century the beet-sugar product was insignificant, amounting to less than 200,000 long tons annually. Since that time the output has increased, until now beet sugar constitutes more than half of the commercial sugar crop of the world. This growth, in the face of competition from the cane-sugar industry, aided by the vast natural advantages of the Tropics, has been made possible only by close scientific study, by mechanical invention, and by the introduction of many practical economies.

## LEGISLATION BEFORE THE BRUSSELS CONVENTION.

The course of development in the beet-sugar industry was influenced largely by legislation. In some directions the expansion of the industry was encouraged; in other directions it was restricted. Legislation affecting the industry, while remarkably varied in character, was strikingly similar in results throughout continental Europe. Its effect was in general to confine the market of each country to domestic sugar, to cause high prices within the country of production, and thus incidentally limit domestic consumption, to provide a large surplus product for exportation, and to lower prices on the world's market to an extent unthought of twenty years ago.

Competition from foreign sugar in the markets of continental Europe was prevented by fixing the rate of duty on imported sugar higher than the excise on the domestic product. The amount of the excise, which was imposed solely for purposes of revenue, determined the minimum limit of domestic prices, while the protective import duty fixed the maximum to which prices might be carried without incurring foreign competition.

The production of beet sugar increased much more rapidly than the domestic consumption, and it became necessary to market the surplus abroad. This was accomplished either by exempting from excise the sugar intended for exportation or by refunding, in the form of a drawback, the excise on all sugar exported. The latter method was first

adopted. The drawback was frequently paid on a basis that, intentionally or otherwise, more than compensated for the excise originally collected, and thus carried a concealed export bounty.

The indefinite amount of the hidden bounty proved unsatisfactory, and the system was changed by all the important countries except Belgium before the Brussels Convention went into effect. In Russia the amount of the drawback was limited to the excise actually paid. France, Germany, Austria-Hungary, and the Netherlands abolished drawbacks and exempted from excise sugar destined for exportation.

In place of the encouragement to exports provided by the drawback, Germany, Austria-Hungary, and the Netherlands granted direct bounties, while Russia and France gave privileges that were equivalent to indirect bounties. France in 1897 also granted a small direct bounty on exported sugar.

### BRUSSELS CONVENTION.

Prior to September 1, 1903, when the Brussels Convention went into effect, a prohibitory import duty, a high excise, and governmental encouragement of exportation were thus general throughout continental Europe. The Brussels Convention aimed merely to equalize the competition of sugar on the international market by eliminating all legislative aid granted directly or indirectly to exported sugar; it made no attempt to modify the strictly internal regulation of the sugar trade.<sup>a</sup>

In many cases, however, the ability to sell cheaply on the world's market was due indirectly to privileges granted in the case of domestic sales. The French regulations had the general effect of an indirect bounty on production which affected even more conspicuously the export than the domestic trade. The exportation of Russian sugar conferred a special privilege on the domestic market which had a commercial value.

In order to eliminate all regulations that might have the effect of granting government aid to exported sugar, the Brussels Convention consequently prohibited all bounties on exportation, direct or indirect bounties on production, special exemptions from duty, and excessive drawbacks, and also limited the excess of import duty over the consumption tax to 53 cents per 100 pounds in the case of refined sugar and 48 cents in the case of raw (6 and 5.50 francs, respectively, per quintal<sup>b</sup>). The convention thus abolished all direct aid to the sugar industry and even all discrimination in the domestic market against

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<sup>a</sup> The proceedings of the conference and the text of the convention are published by the French Ministry of Foreign Affairs under the title "Primes sucrières, 1895-1902—Conférences internationales de 1898 et de 1901-1902."

<sup>b</sup> The term "quintal" is used uniformly to denote the metric quintal of 100 kilograms (220.46 pounds).



foreign sugar beyond a fixed limit. The latter provision was not to be enforced against the nonexporting countries—Sweden, Italy, and Spain.

Spain did not ratify the convention. Denmark and Russia did not participate in the conference. The convention consequently included Germany, Austria, Hungary, France, Belgium, the Netherlands, Sweden, Italy, and the United Kingdom. Luxemburg and Peru were subsequently admitted.

As a means of enforcing the provisions of the convention a permanent commission was appointed to ascertain how far the legislation of various countries contravened the provisions of the treaty. Countervailing duties were to be imposed on sugar imported from countries granting direct or indirect bounties.

The convention made no attempt to lower excise duties. But, on account of the decreased expenses resulting from the abolition of bounties, several of the States reduced their internal taxes. Domestic prices were consequently lowered, while export prices were raised, so that the difference between them was considerably reduced.

#### INCREASED PRODUCTION OF BEET SUGAR.

The growth of the beet-sugar industry during the last half century has been remarkable. From 200,000 long tons in 1853-54, the European beet-sugar product steadily and rapidly increased to nearly 6,700,000 long tons in 1901-2. In 1902-3 the production amounted to 5,500,000 long tons, and in 1903-4 to 5,800,000 tons. This falling off, while doubtless traceable in part to the Brussels Convention, was mainly due to industrial and trade conditions.

The production of cane sugar in the past fifty years also shows a large increase. In 1853-54 the total cane sugar output of the world was estimated at only 1,200,000 long tons, while in 1903-4 it reached 4,300,000 tons. Moreover, the statistics for cane sugar are far less complete than those for beet sugar. Much cane sugar is produced in countries of no considerable commercial development, where accurate statistics are not collected. In many cases the statistics available cover only the exports—the quantity placed on the world's market—and exclude sugar consumed within the country of production. The case of India is perhaps most marked. There a large annual production, estimated at about 3,000,000 tons, is almost entirely consumed at home and is omitted from commercial estimates of the world's sugar crop. It must be explained also that the statistics have become progressively more accurate and complete, partly by the gradual inclusion of countries not reported in earlier years; so that the figures given exaggerate the actual increase.

The relative increase in beet-sugar production is even more conspicuous than the actual increase. In 1853-54 cane sugar constituted 86

per cent of the world's commercial sugar crop; beet sugar only 14 per cent. Half a century later cane sugar contributed 42 per cent, while beet sugar, including the United States crop, furnished about 58 per cent.

While these figures include as far as possible the sugar consumed within the country of production, they represent the quantities that enter into commerce rather than the entire production of the world. With the home consumption of sugar in India added to the commercial estimates the total production of cane sugar still exceeds that of



FIG. 1.—The world's production of beet and cane sugar, 1853-54 to 1903-4.

beet sugar. But the sugar product lost to statistics has little or no effect on the world market. The preponderance of beet sugar shown statistically does not exaggerate its actual importance as a factor in determining the world price of sugar or the direction of the world's sugar trade.

Table 1 shows the commercial production of sugar throughout the world for the last fifty years, together with the relative quantities of cane and beet sugar produced. The increased production of beet sugar is likewise shown graphically in Fig. 1.

TABLE 1.—Commercial sugar production<sup>a</sup> of the world, 1853-54 to 1903-4.

[In tons of 2,240 pounds.]

Years. <sup>b</sup>	Total.	Cane.		Beet.			
				Europe.		United States.	
	<i>Tons.</i>	<i>Tons.</i>	<i>P. ct.</i>	<i>Tons.</i>	<i>P. ct.</i>	<i>Tons.</i>	<i>P. ct.</i>
1853-54 .....	1,420,558	1,219,558	85.9	201,000	14.1	.....	.....
1854-55 .....	1,381,817	1,202,817	87.0	179,000	13.0	.....	.....
1855-56 .....	1,413,498	1,176,498	83.2	237,000	16.8	.....	.....
1856-57 .....	1,509,214	1,259,214	83.4	250,000	16.6	.....	.....
1857-58 .....	1,662,253	1,300,253	78.2	362,000	21.8	.....	.....
Average, 1853-54 to 1857-58....	1,477,468	1,231,668	83.4	245,800	16.6	.....	.....
1858-59 .....	1,893,504	1,510,504	79.8	383,000	20.2	.....	.....
1859-60 .....	1,674,316	1,291,316	77.1	383,000	22.9	.....	.....
1860-61 .....	1,841,264	1,496,264	81.3	345,000	18.7	.....	.....
1861-62 .....	2,006,226	1,601,226	79.8	405,000	20.2	.....	.....
1862-63 .....	1,944,193	1,486,193	76.4	458,000	23.6	.....	.....
Average, 1858-59 to 1862-63....	1,871,901	1,477,101	78.9	394,800	21.1	.....	.....
1863-64 .....	1,869,664	1,433,664	76.7	436,000	23.3	.....	.....
1864-65 .....	1,958,413	1,417,413	72.4	541,000	27.6	.....	.....
1865-66 .....	2,168,872	1,488,872	68.6	680,000	31.4	.....	.....
1866-67 .....	2,022,407	1,378,407	68.2	644,000	31.8	.....	.....
1867-68 .....	2,264,871	1,636,096	72.3	628,775	27.7	.....	.....
Average, 1863-64 to 1867-68....	2,056,845	1,470,890	71.5	585,955	28.5	.....	.....
1868-69 .....	2,233,130	1,585,309	71.0	647,821	29.0	.....	.....
1869-70 .....	2,495,285	1,662,239	66.6	833,046	33.4	.....	.....
1870-71 .....	2,527,181	1,599,488	63.3	927,693	36.7	.....	.....
1871-72 .....	2,650,663	1,791,184	67.6	859,479	32.4	.....	.....
1872-73 .....	2,965,329	1,840,986	62.1	1,124,343	37.9	.....	.....
Average, 1868-69 to 1872-73....	2,574,318	1,695,841	65.9	878,477	34.1	.....	.....
1873-74 .....	2,857,612	1,711,763	59.9	1,145,849	40.1	.....	.....
1874-75 .....	2,922,017	1,756,681	60.1	1,165,336	39.9	.....	.....
1875-76 .....	3,043,749	1,692,828	55.6	1,350,921	44.4	.....	.....
1876-77 .....	2,766,270	1,682,531	60.8	1,083,739	39.2	.....	.....
1877-78 .....	3,114,273	1,715,900	55.1	1,398,373	44.9	.....	.....
Average, 1873-74 to 1877-78....	2,940,784	1,711,940	58.2	1,228,844	41.8	.....	.....
1878-79 .....	3,515,266	1,965,990	55.9	1,549,276	44.1	.....	.....
1879-80 .....	3,334,268	1,903,316	57.1	1,430,952	42.9	.....	.....
1880-81 .....	3,648,847	1,902,346	52.1	1,746,501	47.9	.....	.....
1881-82 .....	3,847,668	2,016,084	52.4	1,831,584	47.6	.....	.....
1882-83 .....	4,217,142	2,104,072	49.9	2,113,070	50.1	.....	.....
Average, 1878-79 to 1882-83....	3,712,638	1,978,361	53.3	1,734,277	46.7	.....	.....
1883-84 .....	4,871,079	2,547,531	52.3	2,323,013	47.7	535	.....
1884-85 .....	5,099,255	2,592,647	50.9	2,505,655	49.1	953	.....
1885-86 .....	4,888,340	2,702,850	55.3	2,184,890	44.7	600	.....
1886-87 .....	5,513,278	2,805,735	50.9	2,706,743	49.1	800	.....
1887-88 .....	5,084,981	2,642,000	52.0	2,442,726	48.0	255	.....
Average, 1883-84 to 1887-88....	5,091,387	2,658,153	52.2	2,432,605	47.8	629	.....

<sup>a</sup>The cane sugar production prior to 1888-89 is taken from trade circulars of Messrs. Rueb & Co., as reprinted in British official reports on the sugar trade (Returns No. 325 of 1881 and No. 172 of 1889). Statistics for 1874-75 to 1880-81 have been increased by adding the exports from Hawaii (see Table 50), which were not included in Rueb's estimates prior to 1881-82. Beginning with 1888-89 the statistics for cane sugar are taken from Willett & Gray's Weekly Statistical Sugar Trade Journal, the returns for each of the first three years being increased 200,000 tons to allow for the product of countries not included prior to 1891-92. Beet sugar statistics for Europe since 1865-66 are Licht's figures, taken from Sugar Cane and the International Sugar Journal, and for the years 1853-54 to 1865-66, inclusive, from Jules Helot's *Le Sucre de Betterave en France*, p. 209. The statistics for the United States beet sugar for 1891-92 to 1894-95 are taken from the annual reports of the Commissioner of Internal Revenue; for 1897-98 from a special report of the Department of Agriculture; for 1899-1900 from the Twelfth Census; and for other years from Willett & Gray.

<sup>b</sup>Prior to 1888-89 the statistics for cane sugar refer to calendar years, but are given as if by campaigns, in order to compare with the beet-sugar statistics. In the production of cane sugar the figures for the calendar year in which the beet-sugar campaign ends are taken as the figures for that campaign; for instance, the production of cane sugar for the calendar year 1854 is given for the campaign of 1853-54.

TABLE 1.—*Commercial sugar production of the world, 1853-54 to 1903-4*—Continued.

Years.	Total.	Cane.		Beet.			
				Europe.		United States.	
	<i>Tons.</i>	<i>Tons.</i>	<i>P. ct.</i>	<i>Tons.</i>	<i>P. ct.</i>	<i>Tons.</i>	<i>P. ct.</i>
1888-89 .....	5,224,379	2,480,700	47.5	2,741,818	52.5	1,861	.....
1889-90 .....	6,054,209	2,475,800	40.9	3,576,206	59.1	2,203	.....
1890-91 .....	6,524,609	2,868,900	44.0	3,652,250	56.0	3,459	.....
1891-92 .....	6,683,497	3,231,561	48.3	3,446,577	51.6	5,359	0.1
1892-93 .....	6,431,609	3,045,186	47.3	3,374,332	52.5	12,091	.2
Average, 1888-89 to 1892-93....	6,183,661	2,820,429	45.6	3,358,237	54.3	4,995	.1
1893-94 .....	7,379,862	3,531,621	47.8	3,828,066	51.9	20,175	.3
1894-95 .....	8,247,553	3,510,670	42.6	4,716,791	57.2	20,092	.2
1895-96 .....	7,056,401	2,809,477	39.8	4,217,704	59.8	29,220	.4
1896-97 .....	7,718,279	2,841,857	36.8	4,838,886	62.7	37,536	.5
1897-98 .....	7,660,068	2,864,255	37.4	4,755,415	62.1	40,398	.5
Average, 1893-94 to 1897-98....	7,612,433	3,111,576	40.9	4,471,373	58.7	29,484	.4
1898-99 .....	7,931,275	2,995,438	37.8	4,903,366	61.8	32,471	.4
1899-1900 .....	8,560,109	3,056,294	35.7	5,430,843	63.4	72,972	.9
1900-1901 .....	9,618,333	3,646,059	37.9	5,895,415	61.3	76,859	.8
1901-2 .....	10,895,588	4,078,944	37.4	6,653,518	61.1	163,126	1.5
1902-3 .....	9,804,339	4,144,453	42.3	5,464,423	55.7	195,463	2.0
Average, 1898-99 to 1902-3....	9,361,929	3,584,238	38.3	5,669,513	60.6	108,178	1.1
1903-4 <sup>a</sup> .....	10,291,000	4,313,000	41.9	5,770,000	56.1	208,000	2.0

<sup>a</sup> Preliminary estimate.**HIGH DOMESTIC PRICES.**

A marked characteristic of the beet-sugar industry has been the extremely high range of prices paid in the continental countries as compared with prices in England and the United States. The average wholesale price of refined sugar, excise paid, in Germany during the sugar year 1902-3 was 6¼ cents per pound; in Belgium, 6½ cents; in Russia and Austria, 7¾ cents; and in France, over 8 cents. In Spain the average price of sugar during 1901-2 was 9 cents per pound, and during 1899-1900, over 10 cents per pound.

In the United States the average price of granulated sugar at New York during the calendar year 1903 was 4.64 cents per pound and during 1902 only 4.46 cents. In 1902-3 the average price of British refined sugar (Tate's cubes No. 1) was 3.87 cents per pound.

The high prices on the Continent have resulted partly from the excise collected on domestic sugar and partly from the combination of sugar producers. The consumption tax on sugar in Germany prior to the Brussels Convention was 2 cents per pound; in Russia, 2½ cents; in Austria-Hungary, 3½ cents; in Belgium, 4 cents; in the Netherlands, 5 cents; and in France, 5¼ cents. In the case of Belgium and France not all of the domestic product was subject to the full rates indicated. The domestic prices were, nevertheless, increased by the total amount of the tax. In Germany and Austria-Hungary, after the formation of the cartels, prices were materially raised with no increase whatever in the excise.

The excise was lowered in several countries when their legislation



was modified in accordance with the provisions of the Brussels Convention. In Germany the consumption tax was lessened one-half cent per pound; in France, 3 cents; in Belgium,  $2\frac{1}{4}$  cents. The effect of these changes on domestic prices is marked. For the sugar year 1903-4 the average price of Belgian sugar was only about 4 cents per pound; of German sugar, less than  $4\frac{1}{4}$  cents; of French sugar, about 5 cents; and of Austrian sugar,  $6\frac{1}{4}$  cents.

It will be noticed that the prices for Belgian and French sugar decreased about as much as the tax. In the case of Germany, however, the price fell 2 cents, while only one-half cent was taken off the tax. In Austria, with no change in the excise rate, the price of refined sugar fell  $1\frac{1}{2}$  cents. The entire fall in the case of Austria and three-fourths of the fall in Germany were undoubtedly due to the abrogation of the old cartels.

### CONSUMPTION OF SUGAR.

In view of the high prices of sugar prevailing on the Continent, it is natural that the average consumption should be much lower than in England and the United States.

During the calendar year 1903 the average consumption of sugar in the United States was 71 pounds per capita and during the calendar year 1902 it was 73 pounds. In the United Kingdom, as estimated by Licht,<sup>a</sup> the average consumption was still higher, reaching 90 pounds per capita during the beet-sugar year 1902-3. In Switzerland, with only one domestic sugar factory, the average consumption for 1902-3 was 63 pounds per capita. In Denmark the per capita consumption was 52 pounds. The larger sugar-producing countries form a marked contrast to those given. In Russia the average consumption per capita was only 11 pounds<sup>b</sup> during 1902-3, less than one-sixth that in the United States. In Austria the per capita consumption was 18 pounds; in Belgium, 22 pounds; in France, 24 pounds; in Germany, 28 pounds, and in the Netherlands, 31 pounds. Spain consumed only 11 pounds and Italy 7 pounds per capita, notwithstanding the rapid growth of sugar production in those countries.

With the lower prices now prevailing, a much enlarged consumption is to be expected, which in time may fully compensate producers for the encouragement withdrawn by the Brussels Convention.

### INCREASED EXPORTS.

The production of beet sugar in Europe increased much faster than the demand. For a number of years there was an increasing difficulty in marketing the surplus production, and continually larger

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<sup>a</sup>Journal des fabricants de sucre, March 30, 1904.

<sup>b</sup>Instead of 18 pounds, as estimated by Licht. See page 54.



quantities were thrown on the world's market. During 1902-3 no less than two-thirds of the total sugar output of Germany and three-fourths of the product of Austria-Hungary was exported.

### LOW EXPORT PRICES.

It was, of course, impossible to market these enormous quantities of sugar abroad at prices at all comparable with those obtained in the domestic market. German granulated sugar at Hamburg, free on board, was quoted on the average at only 2 cents per pound during the beet-sugar year 1902-3, while the average price of cut-loaf sugar at Magdeburg for domestic use was over 6 cents per pound. The difference in quality between the two grades represents but a small part of the difference in price. In Austria-Hungary the prices of sugar for domestic consumption and for exportation differed even more widely. At Prague refined sugar was quoted during 1902-3 at 7 $\frac{3}{4}$  cents per pound, while at Trieste export sugar was 2 cents per pound.

The difference in price was due principally to the excise on sugar consumed and the bounty on sugar exported. The difference increased after the formation of the cartels. Since the ratification of the Brussels Convention domestic prices have fallen, while export prices have increased.

### SUGAR COMBINATIONS.

Strong national combinations of producers have been not infrequent in the continental beet-sugar industry. Of these the cartels of Austria-Hungary and Germany were probably the most conspicuous. The higher profits derived from domestic sales of sugar led to the apportionment of such sales among the various producers by private agreement, in order to increase prices by limiting the supply. In Russia the amount and the apportionment of domestic sales were regulated by the Government.

The sugar combinations aimed to raise domestic prices so as to realize the utmost possible profit. When the Brussels Convention went into effect, the cartels were dissolved, but the Hungarian producers formed a new combination, modified to suit changed conditions.

In Spain, which did not sign the Brussels convention, and in Italy, which was exempted from the provision limiting the import duty, sugar combinations apportion the output among the various producers.

### ACCUMULATION OF SURPLUS STOCKS.

In spite of the enormous quantities of sugar exported, a large stock was accumulated in all of the leading countries of Europe. On September 1, 1903, over 3,000,000,000 pounds, about one-fourth of the total output, was left over from the sugar year 1902-3, while the surplus at the end of the sugar year 1901-2 was even larger.

The large stocks of sugar had the natural effect of restricting materially the acreage devoted to sugar beets. The beet area planted in the eight principal countries of Europe was estimated<sup>a</sup> at 4,653,000 acres in 1901. For 1902 the area was 4,179,000 acres, for 1903 4,041,000 acres, and for 1904 only 3,777,000 acres. The decrease in the three years was nearly 19 per cent. The Brussels Convention probably contributed somewhat to the restriction in acreage. With the possibility that the profits on foreign sales would be materially decreased, it was natural that steps should be taken to lessen the surplus production above domestic requirements.

### IMPROVED METHODS.

Legislation has undoubtedly contributed to the growth of the beet-sugar industry in Europe, but its remarkable progress is due primarily to the scientific methods employed in beet raising and in sugar manufacture.

To insure the production of high-grade beets agricultural operations have been closely supervised by the factories. The seed is largely furnished by the factories, and scientific methods of crop rotation, preparation of the soil, fertilization, and cultivation are rigidly enforced.

In the factory all details of manufacture have been closely studied. The equipment of the factories has been greatly improved, their capacity increased, and new economies effected. Twenty years ago diffusion had already been substituted in most cases for mechanical pressure as a means of extracting beet juice. New processes have since been introduced for extracting sugar from molasses. Molasses, formerly a waste product used only for distillation, has become an important raw material for sugar making. In 1902-3 no less than 8 per cent of the total sugar production of Germany was contributed by factories equipped solely for utilizing molasses.

The effects of improved methods in the beet-sugar industry may be shown statistically in two ways: (1) By ascertaining the average yield of beets per acre in various countries for a series of years, together with the average extraction of sugar from beets; (2) by ascertaining the average number of laborers and the average amount of mechanical power required to produce a given quantity of sugar. These comparisons furnish criteria for measuring the success of the industry in various countries as well as its progress in any one country.

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<sup>a</sup>According to the International Association for Sugar Statistics, Deutsche Zucker-industrie, 1902, p. 766, 1903, p. 844, 1904, statistical part, p. 254. The countries included in the estimates are Germany, Austria-Hungary, France, Russia, Belgium, Netherlands, Sweden, and Denmark.

## AVERAGE YIELD OF BEETS.

During the last twenty years there has been a striking improvement in the methods of beet culture in the leading countries of Europe. The improvement has resulted not so much in the increased yield of beets per acre as in the larger sugar content of the beets.

In Germany, for instance, the average yield per acre in 1902, as shown in Table 2, was less than 12 short tons of beets. This yield,

TABLE 2.—Average yield of sugar beets per acre in the principal countries of Europe.

Year. <i>a</i>	Germany.	Austria-Hungary.			France.	Russia.	Belgium.	Nether- lands.
		Total.	Austria.	Hungary.				
	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1882.....	15.35	9.27	9.27	9.22	15.72	6.53	15.15	10.20
1883.....	13.32	( <i>b</i> )	( <i>b</i> )	9.14	15.49	5.36	15.19	12.66
1884.....	14.67	8.65	8.79	7.75	13.51	5.65	14.86	12.40
1885.....	13.49	7.72	7.61	8.23	12.63	7.52	11.92	11.17
1886.....	13.39	7.99	8.17	7.19	14.41	7.10	15.19	9.58
1887.....	17.78	7.00	7.11	6.50	11.76	7.55	13.61	10.32
1888.....	12.57	9.09	9.21	8.53	12.09	7.63	9.11	7.07
1889.....	14.66	9.75	9.94	8.98	14.08	7.21	17.50	14.63
1890.....	14.36	9.33	10.06	6.63	12.09	7.23	14.08	11.62
1891.....	12.57	9.33	9.55	8.52	11.21	6.24	12.13	8.33
1892.....	12.43	9.29	9.62	8.14	10.77	5.64	13.61	13.61
1893.....	12.29	8.20	8.17	8.28	10.41	7.54	15.69	11.92
1894.....	14.67	9.65	10.48	7.09	12.71	7.23	14.44	9.84
1895.....	13.82	8.69	9.13	7.47	11.98	7.00	12.95	13.09
1896.....	14.41	10.28	10.70	8.92	14.02	7.22	14.48	17.06
1897.....	13.98	10.00	10.40	8.85	12.84	6.62	12.84	13.34
1898.....	12.71	9.75	10.04	8.93	11.22	6.12	12.43	13.01
1899.....	13.00	11.44	11.96	9.72	11.54	6.73	14.90	15.89
1900.....	13.21	9.71	9.78	9.67	11.62	5.47	15.31	14.48
1901.....	14.92	10.99	11.56	9.41	11.87	6.88	15.72	16.49
1902.....	11.76	10.30	10.69	9.48	11.10	6.53	12.78	12.28
1903.....	13.63	11.22	11.49	( <i>b</i> )	12.27	6.24	11.66	10.79

*a* The beet crops harvested in the years indicated were worked by factories during the ensuing campaign (ending July or August of the following year).

*b* Not stated.

however, was much below the average. For the last five years the average yield per acre was about 13 short tons, while the average yield for the five years 1882-1886 was about 14 tons per acre. By care in the selection of mother beets and in the methods of fertilization and culture, the quality of the beet has been greatly improved, partly at the expense of tonnage. The factories require beets light in weight and rich in sugar. But, while statistics of average yield show little in regard to agricultural improvement within a single country, they constitute a fairly satisfactory standard for comparing the success of the beet crop in different countries.

In tonnage Germany is surpassed only by the Netherlands and Belgium. For 1899-1903 the average yield in the Netherlands was nearly 14 short tons and in Belgium over 14 tons per acre, as compared with 13 tons in Germany. The average yield in France, Austria, and Hungary ranges considerably lower. Beet growing in Russia is carried on under unfavorable conditions of climate and cultivation, and exceedingly poor results are obtained. In 1903 the average yield was only 6½ short tons per acre; in 1901 and 1902, less than 7 short tons; and in 1900, only 5½ short tons.

## AVERAGE SUGAR EXTRACTION.

The increase in the average amount of sugar obtained from a given quantity of beets is shown in Table 3. Both agricultural improvement and improvement in factory methods have contributed to this end; the former has aimed to increase, and the latter to extract more completely, the sugar content of the beet.

TABLE 3.—Average extraction of raw sugar in the principal countries of Europe.

Sugar year.	Germa- ny. <sup>a</sup>	Austria-Hungary.			France.	Russia.	Bel- gium.	Nether- lands.	Swe- den.
		Total.	Austria.	Hunga- ry.					
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
1882-83.....	9.51	10.08	(b)	(b)	5.05	8.51	(c)	(c)	(c)
1883-84.....	10.54	11.23	(b)	(b)	5.65	9.41	(c)	(c)	7.81
1884-85.....	10.80	11.66	(b)	(b)	6.00	9.45	(c)	(c)	9.11
1885-86.....	11.43	11.75	(b)	(b)	8.20	9.58	(c)	(c)	9.06
1886-87.....	12.26	11.83	(b)	(b)	9.55	10.03	(c)	(c)	10.30
1887-88.....	13.77	12.31	(b)	(b)	9.92	10.12	(c)	(c)	10.98
1888-89.....	12.55	10.73	10.71	10.98	10.25	11.25	(c)	(c)	10.31
1889-90.....	12.84	11.69	11.92	9.48	11.08	10.65	(c)	(c)	10.69
1890-91.....	12.58	11.39	11.51	10.39	9.87	10.48	(c)	(c)	9.45
1891-92.....	12.63	11.51	11.72	10.02	10.83	12.55	(c)	(c)	10.32
1892-93.....	12.54	11.10	11.23	10.16	10.04	12.16	(c)	(c)	10.78
1893-94.....	12.83	12.48	12.74	10.97	10.28	11.38	12.02	11.04	11.54
1894-95.....	12.59	11.80	12.04	10.13	10.43	10.98	11.00	11.38	11.60
1895-96.....	14.02	13.36	13.66	12.13	11.54	12.89	12.45	12.24	10.75
1896-97.....	13.27	11.79	12.13	10.19	10.38	12.16	12.01	12.48	11.86
1897-98.....	13.46	11.91	11.99	11.59	12.07	11.98	13.03	13.70	12.42
1898-99.....	14.18	13.27	13.54	12.23	12.81	12.38	13.97	13.35	12.33
1899-1900.....	14.43	12.85	13.01	12.22	12.42	12.02	13.66	13.68	12.99
1900-1901.....	14.93	14.26	14.60	13.18	12.62	13.66	12.99	14.54	13.10
1901-2.....	14.38	14.40	15.10	12.13	11.87	12.98	12.97	13.66	13.87
1902-3.....	15.87	14.71	15.01	13.96	13.14	13.07	13.88	14.38	14.34
1903-4.....	15.18	14.85	(c)	(c)	12.33	15.42	12.89	13.20	(c)

<sup>a</sup> Representing, prior to 1886-87, the average results obtained by beet factories; for subsequent years, the average extraction for the entire sugar industry of the Empire.

<sup>b</sup> No official returns of sugar production prior to August 1, 1888.

<sup>c</sup> Not stated.

The average extraction has varied greatly in different countries, but in all cases a steady improvement is noticeable. Germany shows an increase in the sugar extraction from less than 10 per cent of the beets worked during the sugar year 1882-83 to over 15 per cent in 1903-4. In France the average extraction during the same period was more than doubled, increasing from 5 per cent in 1882-83 to 12 per cent in 1903-4.

For Germany the average extraction is generally higher than for any other country. The highest extraction recorded for Germany was 15.87 per cent for 1902-3, equal to 317 pounds of sugar per ton of beets. Austria came second, in 1901-2 even surpassing Germany. Preliminary statistics for the year 1903-4 indicate an average sugar extraction for Russia of 15.42 per cent, a rate considerably above that obtained in any other country of Europe.

## PRODUCTION OF SUGAR PER ACRE.

The average yield of beets per acre, as shown in Table 2, and the average sugar extraction, shown in Table 3, bring out different aspects of the progress in the beet-sugar industry. A more accurate measure



of improvement, both on the farm and in the factory, is the average sugar production per acre, shown in Table 4.

TABLE 4.—Average production of beet sugar per acre.

Sugar year.	Ger- many.	Austria-Hungary.			France.	Russia.	Belgium.	Nether- lands.
		Total.	Austria.	Hungary.				
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
1882-83.....	2,917	1,873	(a)	(a)	1,588	1,110	(b)	(b)
1883-84.....	2,811	(b)	(a)	(a)	1,756	1,008	(b)	(b)
1884-85.....	3,169	2,015	(a)	(a)	1,621	1,068	(b)	(b)
1885-86.....	3,089	1,814	(a)	(a)	2,071	1,444	(b)	(b)
1886-87.....	3,281	1,894	(a)	(a)	2,752	1,427	(b)	(b)
1887-88.....	4,890	1,722	(a)	(a)	2,328	1,525	(b)	(b)
1888-89.....	3,155	1,954	1,971	1,877	2,478	1,717	(b)	(b)
1889-90.....	3,768	2,282	2,366	1,706	3,126	1,536	(b)	(b)
1890-91.....	3,619	2,127	2,314	1,379	2,382	1,518	(b)	(b)
1891-92.....	3,180	2,146	2,235	1,704	2,433	1,566	(b)	(b)
1892-93.....	3,120	2,062	2,164	1,652	2,165	1,371	(b)	(b)
1893-94.....	3,159	2,050	2,083	1,813	2,144	1,719	3,766	2,634
1894-95.....	3,697	2,277	2,526	1,439	2,656	1,591	3,177	2,244
1895-96.....	3,870	2,320	2,492	1,815	2,767	1,806	3,225	3,207
1896-97.....	3,819	2,426	2,600	1,820	2,916	1,754	3,475	4,265
1897-98.....	3,761	2,380	2,496	2,053	3,094	1,589	3,351	3,655
1898-99.....	3,610	2,584	2,721	2,188	2,872	1,518	3,468	3,474
1899-1900.....	3,757	2,940	3,110	2,372	2,862	1,615	4,068	4,217
1900-1901.....	3,950	2,767	2,841	2,553	2,928	1,493	3,981	4,214
1901-2.....	4,297	3,165	3,491	2,287	2,813	1,789	4,071	4,502
1902-3.....	3,728	3,028	3,207	2,635	2,919	1,704	3,553	3,537
1903-4.....	4,144	3,332	(b)	(b)	3,031	1,922	3,008	2,849

<sup>a</sup> No official returns of sugar production prior to August 1, 1888.

<sup>b</sup> No data available.

It does not seem fair to give an average obtained by dividing the area cultivated directly into the quantity of sugar produced. In the case of the Netherlands and Belgium, especially, there are considerable shipments of beets across the borders. The same movement also affects France, but to a less extent relative to the total product. Those three countries constitute a single unit as far as the beet crop is concerned, and the roots harvested are frequently worked up in factories across the national boundary from where they are produced. In the case of Germany acreage statistics for the earlier years relate only to a portion of the crop. For these reasons the average yield of sugar per acre, as shown in Table 4, is calculated by multiplying the average yield of beets per acre by the average sugar produced per short ton of beets worked.

During the period covered by the table a remarkable increase in the average sugar production per acre has taken place. In Germany the results for the first five years (1882-83 to 1886-87) show an average of 3,053 pounds of sugar per acre of beets and for the last five years (1899-1900 to 1903-4), 3,975 pounds per acre, an increase of 30 per cent. In Austria-Hungary there was an increase of 60 per cent. from 1,899<sup>a</sup> to 3,046 pounds per acre; in France an increase of 49 per cent. from 1,956 to 2,910 pounds per acre; and in Russia an increase of 41 per cent. from 1,211 to 1,709 pounds per acre.

<sup>a</sup> Average for the four years 1882-83, 1884-85, 1885-86, and 1886-87.



In most years Germany is surpassed by no other country in the average quantity of sugar produced per acre of beets. The average sugar production was nearly 4,300 pounds for 1901-2. For 1902-3 the average was much lower, amounting to 3,728 pounds of sugar per acre, while in 1903-4 4,144 pounds of sugar per acre were produced.

The Netherlands and Belgium in some years show a larger average production of sugar than Germany. For 1901-2 and the two earlier sugar years the average quantity of sugar produced from a single acre in the Netherlands was greater than in any other country. In four years an average of more than 4,200 pounds of sugar per acre was obtained. The results in Belgium are also extremely good. The high averages shown for these two countries are due principally to their high tonnage of beets per acre.

In Russia the average sugar production per acre of beets is very much lower than in any other important European country. In 1902-3 only 1,725 pounds of sugar per acre were obtained, and in 1903-4 1,922 pounds. These poor results are attributable principally to the low average yield of beets.

The quantity of sugar obtained from an acre of sugar beets in Europe is still far from equal to that obtained from an acre of cane in the Tropics. In Java the highest average is that for 1899, when nearly 8,300 pounds of cane sugar were produced per acre, showing a yield 70 per cent greater than the highest for Germany. In Hawaii even larger yields are recorded. In 1899 the average production was 9,400 pounds, and in 1901, 9,200 pounds.

#### LABOR AND MECHANICAL POWER.

The results of improved methods on the average beet-sugar production per acre have been discussed. Technical and mechanical improvements in the factory have likewise had the effect of substituting mechanical power for manual labor and even to some extent of economizing the power employed.

There has been a marked decrease during the last twenty years in the average number of laborers required to produce a given quantity of raw sugar. In 1882-83, 52 laborers were employed in the German factories for each million pounds of sugar produced, while in 1902-3 only 13 were required. In France, during 1882-83, 106 laborers were required to produce each million pounds of raw sugar; in 1902-3, only 25. In 1900-1901 40 laborers were required in Austria and 25 in Hungary for each million pounds of output.

Considerable variation has also occurred in the average mechanical power employed in connection with the manufacture of sugar. Two conflicting forces have been in operation. Improved methods have

resulted to some extent in the substitution of mechanical power for manual labor. Other improvements have occasioned a decrease in the average power required to produce a given output.

In the German factories, the general introduction of diffusion in place of mechanical pressure occurred between 1871-72 and 1882-83. In the former campaign only 52 out of the 311 beet factories in operation used the diffusion process; in the latter, out of 358 all but 15 used diffusion. With the change of process, a reduction in the power employed from 44 to 22 horsepower per million pounds of output was effected, together with a reduction to one-third in the average number of laborers. Subsequent improvements have resulted in the substitution of steam power for manual labor. The average steam power per million pounds of sugar consequently increased to 28 horsepower in 1901-2 and 38 horsepower in 1902-3.

In the well-equipped factories of Hungary, an average of only 25 horsepower per million pounds was used during 1900-1901. In the Austrian factories, machinery of 29 horsepower, aided by 40 laborers, was required to obtain 1,000,000 pounds. Machinery of equal power and the same number of laborers in Hungary produced 1,600,000 pounds.

TABLE 5.—Average labor and mechanical power required to produce 1,000,000 pounds of raw sugar.

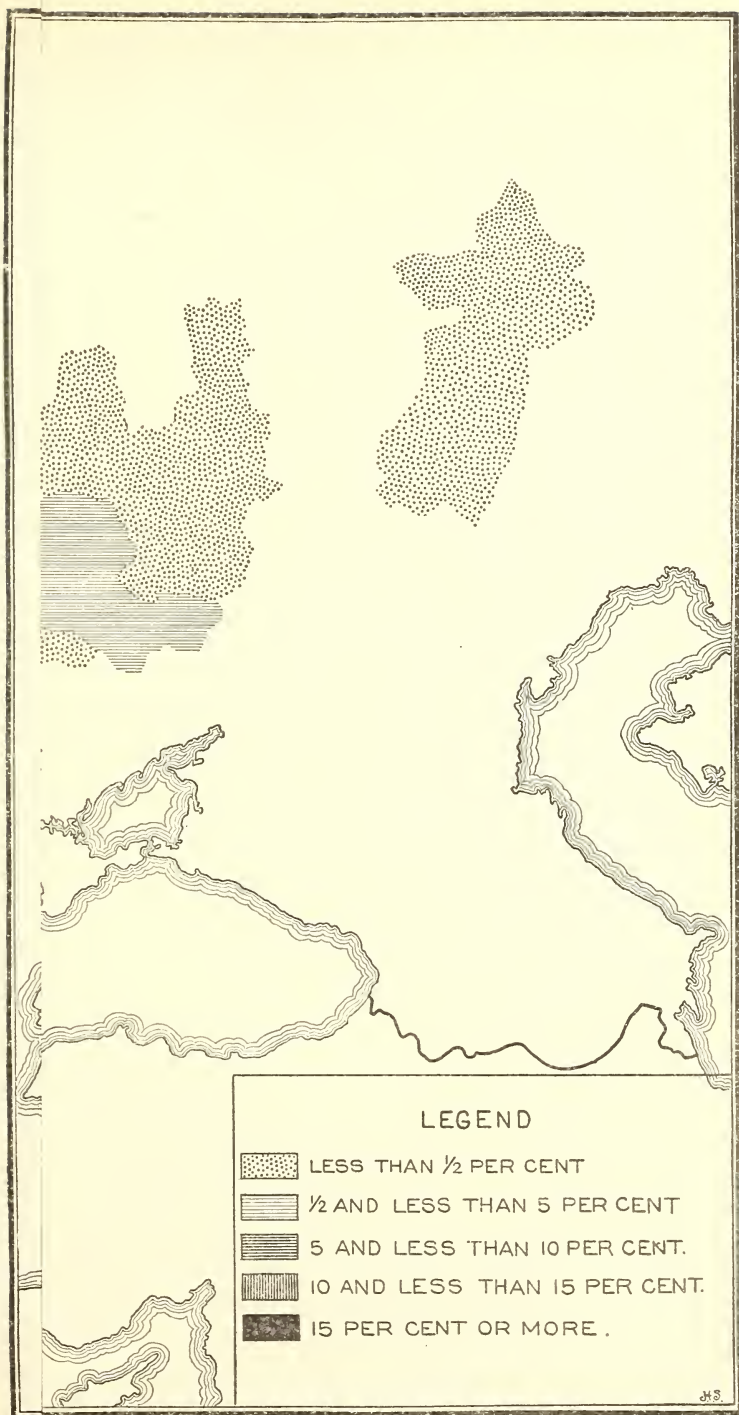
Sugar year.	Number of laborers.					Mechanical power. <sup>a</sup>				
	Ger- many.	Austria-Hungary.			France.	Ger- many.	Austria-Hungary.			France.
		Total.	Austria.	Hun- gary.			Total.	Austria.	Hun- gary.	
1882-83.....	52	63	(b)	(b)	106	22	21	(b)	(b)	55
1883-84.....	43	64	(b)	(b)	68	22	25	(b)	(b)	48
1884-85.....	39	46	(b)	(b)	94	23	19	(b)	(b)	71
1885-86.....	37	75	(b)	(b)	86	32	33	(b)	(b)	67
1886-87.....	33	52	(b)	(b)	47	27	23	(b)	(b)	41
1887-88.....	30	67	(b)	(b)	58	29	32	(b)	(b)	53
1888-89.....	32	59	60	51	49	29	36	37	22	46
1889-90.....	29	45	44	55	29	24	27	27	28	27
1890-91.....	28	45	44	51	35	24	28	28	26	34
1891-92.....	26	44	44	43	57	29	30	30	27	36
1892-93.....	24	44	44	42	41	32	31	31	30	43
1893-94.....	22	42	43	36	42	30	32	33	27	43
1894-95.....	21	37	35	47	31	24	30	29	33	33
1895-96.....	18	48	49	41	35	29	42	45	28	40
1896-97.....	18	42	43	36	32	28	37	38	33	39
1897-98.....	16	47	50	34	29	30	43	45	32	35
1898-99.....	16	38	40	28	28	34	35	37	24	38
1899-1900.....	15	36	38	28	24	34	34	36	25	33
1900-1901.....	14	37	40	25	20	31	36	39	25	29
1901-2.....	14	(b)	(b)	25	20	28	(b)	(b)	25	31
1902-3.....	13	(b)	(b)	(b)	25	38	(b)	(b)	(b)	42

<sup>a</sup> In metric horsepower, about 1 per cent less than the English horsepower.

<sup>b</sup> Not stated.

## LOCALIZATION OF THE BEET CROP OF EUROPE.

The percentage of the total arable land in Europe devoted to the culture of sugar beets is shown in Plate I. Unfortunately, the statistics available for different countries do not cover exactly the same period. Averages for the latest five years have been used wherever









LEGEND

[Dotted pattern]	LESS THAN 1/2 PER CENT
[Horizontal lines]	1/2 AND LESS THAN 5 PER CENT
[Diagonal lines (top-left to bottom-right)]	5 AND LESS THAN 10 PER CENT.
[Diagonal lines (bottom-left to top-right)]	10 AND LESS THAN 15 PER CENT.
[Solid black]	15 PER CENT OR MORE.

PROPORTION OF THE TOTAL ARABLE LAND IN EUROPE DEVOTED TO SUGAR BEETS.





practicable, but in some cases it was necessary to use averages for a shorter period and even statistics for a single census year. It should be noted that the sugar-beet area in Italy has trebled since 1899, the only year for which data by provinces are available.

In addition to the countries shaded in the map, Switzerland, Bosnia, Servia, and Greece possess each one beet factory, located, respectively, at Aarberg, Usora, Belgrade, and Trikala, and Bulgaria two factories, at Sofia and Philippopolis.

### **BET SUGAR PRODUCTION OF VARIOUS EUROPEAN COUNTRIES.**

The earliest production of beet sugar in Europe on a commercial scale took place in France during the Napoleonic wars. At that time the sugar supply of France was drawn mainly from her West Indian colonies. The continental blockade and other commercial restrictions growing out of the war with England suddenly stopped direct colonial trade. The interruption to the supply of colonial sugar gave an enormous impetus to the culture of beets which for some time previous had been recognized as a possible source of sugar.

France was for years the principal and, for part of the time, the sole seat of the sugar industry in Europe. It was not until after the middle of the nineteenth century that Germany took the lead. Since that time the industry has increased at a much slower pace in France than in other countries. The production of France is now surpassed not only by Germany, but by Russia and Austria-Hungary as well.

The rapidity of the increase of sugar production in Russia during the last decade is remarkable. In 1892-93 Russia contributed only 13 per cent of the total sugar production of Europe, while in 1902-3 its proportion was 23 per cent. During the latter year Russia was surpassed in sugar production only by Germany. It is a source of speculation whether the withdrawal of government aid on the part of countries adhering to the Brussels Convention will tend further to increase the relative importance of the Russian industry.

Fifty years ago Austria-Hungary held third place among the European beet-producing nations; twenty-five years later it surpassed France; in 1902-3 it in turn gave way to Russia.

While Germany entered the field somewhat later than France, its production has steadily increased, and the methods, both of culture and of manufacture, have been constantly improved until it has become more closely identified with the beet-sugar industry than any other country. No other country equals Germany in the average quantity of sugar produced per acre of beets cultivated. During the last five years Germany produced about one-third of the entire sugar output of Europe.

Plate II shows the beet-sugar production of each of the important countries of Europe for the last fifty years.

## GERMANY.

## AREA DEVOTED TO SUGAR BEETS.

In view of the preeminent position that Germany has attained in beet-sugar production, it is rather surprising to find that less than 2 per cent of the cultivated land of Germany in 1900 was devoted to beets. Of the 63,688,854 acres of arable land, 1,138,983 acres were planted in beets. By way of comparison, it may be noted that rye occupied nearly 23 per cent of the land in cultivation; oats, 16 per cent; potatoes, 12 per cent; wheat, 8 per cent; and barley, more than 6 per cent.<sup>a</sup> The proportion of arable land devoted to sugar beets has increased materially since 1878. In that year beets occupied only 0.68 per cent of the arable land; in 1883, 1.28 per cent; and in 1893, 1.51 per cent, as compared with 1.75 per cent in 1900. For other years no statistics are available.

The acreage devoted to the various crops fails to bring out the real importance of the sugar beet in German agriculture. In the first place, beet culture is extremely intensive, so that, relatively to other crops, the value of the crop for Germany as a whole is much greater than the area devoted to it would seem to indicate. In the second place, the culture of the beet is much more localized than the cultivation of cereals and potatoes, so that the relative area devoted to the beet in particular districts is far greater than the corresponding figure for the whole Empire.

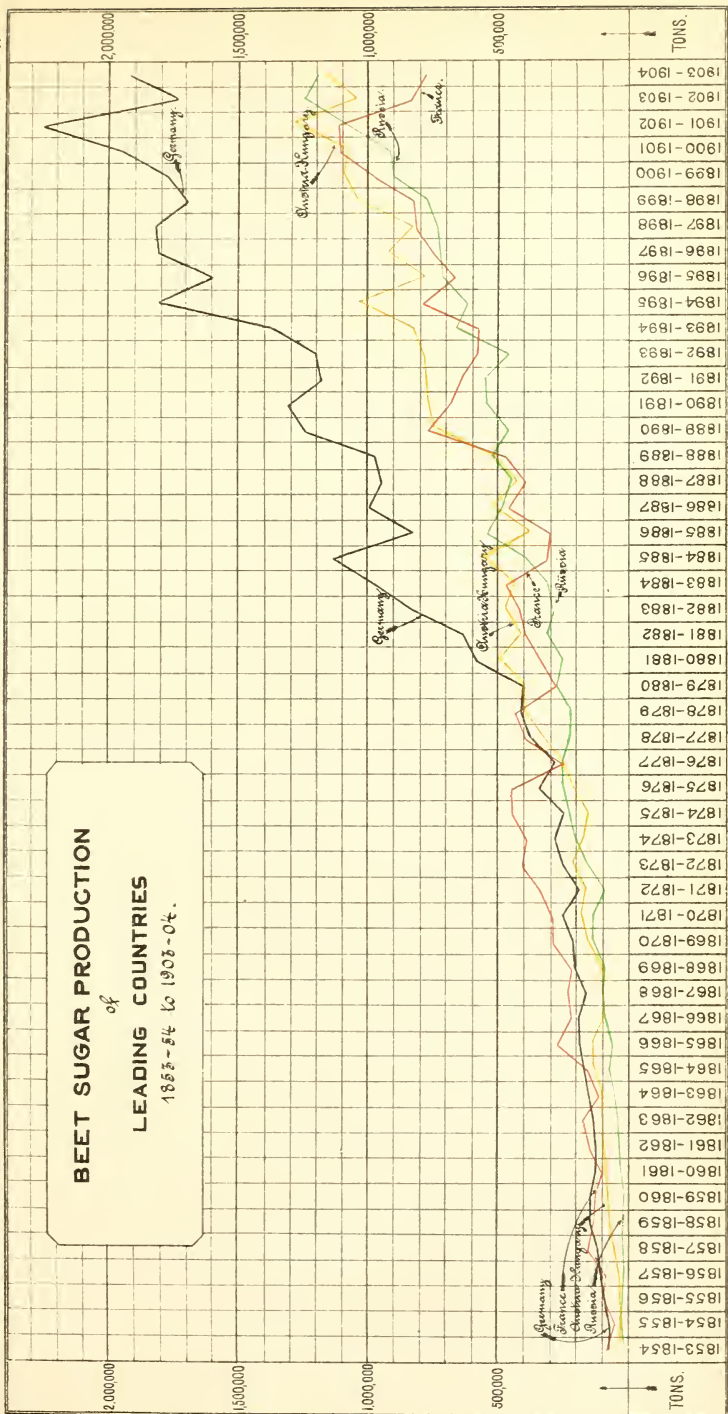
## VALUE OF THE CROP.

In order to show the real importance of sugar beets in German agriculture, it is necessary to compare the total value of that crop with the value of other leading crops. The official German crop statistics give the annual production of rye, oats, wheat, barley, and potatoes, while Table 10 shows the quantity of beets used by the German beet factories during each campaign.

Average prices for each crop year (August 1 to July 31) have been calculated from the monthly quotations at various leading German cities. For grains, the cities taken were Breslau, Frankfort, Konigsberg, Leipzig, and Munich; for potatoes, Berlin, Breslau, Magdeburg, and Stettin. The quotations represent average wholesale prices, which exceed farm values by the amount of freight charges, profits to middlemen, etc. For sugar beets the average price paid by beet factories to the farmers during each factory year is available. The price of beets shows much more exactly the receipts of the farmer than do the wholesale prices, which are used for the other products.

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<sup>a</sup> Vierteljahrshefte zur Statistik des Deutschen Reichs, 1902, III, pp. 125-193.







The total value of the leading crops has been estimated by multiplying the production for each of the five years, 1898–1902, by the average price for the ensuing twelve months (beginning August 1 of the year the crop was harvested). The average annual value for each of the crops considered, together with the quantity harvested, is shown in Table 6.

TABLE 6.—*Acreage, production, and value of the leading crops in Germany; annual average, 1898–1902.*

Crop.	Area.	Production.	Estimated value.	Average value per acre.
	<i>Acres.</i>	<i>Bushels.</i>	<i>Dollars.</i>	<i>Dollars.</i>
Rye .....	14,696,478	345,771,316	302,646,524	21
Oats .....	10,223,409	485,647,752	259,898,923	25
Wheat .....	4,709,081	130,038,110	135,046,363	29
Barley .....	4,175,750	139,959,940	108,000,331	26
Potatoes .....	7,902,374	1,528,094,827	318,651,012	40
Sugar beets .....	1,091,632	614,893,089	60,167,934	55

<sup>a</sup> Obtained by multiplying the crop for each year by its average price for the ensuing twelve months (August 1 to July 31), and then taking an average of the results.

<sup>b</sup> Short tons.

During the period 1898–1902, the leading crop in point of value was potatoes, which had an average yearly value of \$319,000,000. Next came rye, with an average annual value of \$303,000,000; followed by oats, valued at \$260,000,000; wheat, valued at \$135,000,000; and barley, valued at \$108,000,000. Sugar beets brought the German farmers an average yearly return of \$60,000,000, which, while less than the values for the other crops, is nevertheless high, especially in view of the fact that the value given for potatoes and cereals is based on prices not on the farm, but in the wholesale trade of the cities.

In connection with the statistics of value, there is also shown in Table 6 the average area devoted to each crop, together with its average value per acre. This comparison brings out clearly the remarkably intensive character of beet cultivation. While 1 acre of land sown to rye produced a crop valued at \$21, an acre of oats \$25, an acre of barley \$26, an acre of wheat \$29, and an acre of potatoes \$40, a crop worth \$55 was obtained from each acre of beets. As in the preceding comparison, beets are materially undervalued in relation to the other crops. The raw sugar produced from each acre of beets was worth on the average \$76.

The intensive character of beet culture is said to have had an important effect in increasing the fertility of the soil. Beets are cultivated in no haphazard manner, but have a definite position in a scientific rotation of crops, differing from place to place, according to natural conditions. The rotation perhaps most generally followed brings beet growing between the production of two cereals, winter wheat or rye frequently preceding, and spring barley following, the beet crop.

## LOCALIZATION OF THE BEET CROP.

The localization of the beet crop in Germany is still marked, although there has been a tendency toward the spread of the culture.

The principal beet area of Germany is situated in the central part of the Empire and comprises the Prussian provinces of Saxony and Hanover and the adjoining duchies of Brunswick and Anhalt. In the Magdeburg district of the province of Saxony more than 10 per cent of the entire cultivated area in 1900 was devoted to beets.<sup>a</sup> In the duchies of Brunswick and Anhalt the proportion was still higher, amounting to nearly 14 per cent for Brunswick and 12 per cent for Anhalt. In the Hildesheim district of Hanover about 10 per cent of the cultivated area was planted in beets.

A second important beet area is situated in the east of Germany, embracing the Prussian provinces of Silesia, Posen, and West Prussia, but in this area beet culture is much less concentrated than in central Germany. About 4.4 per cent of the cultivated land in the Breslau district of Silesia was occupied by beets during 1900; in the Bromberg district of Posen, 3.8 per cent; and in the Danzig district of West Prussia, 2.5 per cent.

In the district of Cologne, in western Germany, beets were planted on nearly 5 per cent of the total cultivated area.

A comparison of the quantity of sugar obtained from the various districts is of interest. The Prussian province of Saxony alone, while comprising altogether less than one-twentieth of the total land surface of Germany, produced in 1901-2 more than one-fourth of the entire sugar output, or, together with the adjoining duchies of Brunswick and Anhalt and the province of Hanover, about 46 per cent of the sugar output of the Empire. In 1883-84 the output of this sugar district, while in absolute amount only about one-half that in 1901-2, constituted not far from 70 per cent of the production of the Empire.

The east German district, comprising the Prussian provinces of Silesia, Posen, and West Prussia, furnished in 1901-2 somewhat less than 30 per cent of the sugar.

The rest of Germany contributed about 25 per cent of the sugar output in 1901-2, as compared with but 6 per cent in 1883-84. The production of sugar during the last twenty years has thus tended to spread in the outlying districts much more rapidly than in the great beet section of central Germany.

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<sup>a</sup> See Vierteljahrshefte, 1902, III, pp. 125-193.

## LEGISLATION.

The directive effect of legislation on the beet industry of Germany has been so marked that, before the results can be satisfactorily discussed, it is necessary to consider in general the character of the laws relating to sugar. The policy of the Government, at least prior to the Brussels Conference, looked to developing the industry and to obtaining a large revenue from it, rather than to reducing the domestic price.

An import duty on foreign sugar, a tax on the beets worked in domestic factories, and a drawback on sugar exported were the principal features of German legislation prior to August 1, 1888. From September 1, 1869, to July 31, 1886, the beet tax was fixed at 17 cents per 100 pounds (1.60 marks per quintal), and from August 1, 1886, to July 31, 1888, at 18 cents per 100 pounds (1.70 marks per quintal). Raw sugar exported received at first during this period a drawback of \$2.03 per 100 pounds (18.80 marks per quintal). While the tax was imposed according to the quantity of beets, the drawback was based on the quantity of sugar. Every increase in the amount of sugar extracted from a given quantity of beets consequently increased the drawback without increasing the tax. An incentive was thus given to improvement in the quality of beets and in methods of extracting sugar. When 11.75 quintals of beets were required to produce one quintal of sugar, or, in other words, when the sugar yield was 8.51 per cent of the beets consumed, the drawback precisely repaid the amount of beet tax collected. When more than this quantity of beets was required, or, in other words, when the sugar yield was below 8.51 per cent, the reimbursement was less than the tax imposed; but when, on the contrary, the sugar yield exceeded 8.51 per cent, and less than 11.75 quintals of beets were needed to produce a quintal of sugar, the drawback amounted to more than repayment of the corresponding beet tax. It seems probable that originally it was not intended to bestow a hidden bounty on the exporter, but to fix an amount that would repay as precisely as possible the tax paid. During the sugar years 1871-72 to 1873-74 the average quantity of beets actually required to produce a quintal of sugar was over 12 quintals, even more than the quantity assumed in fixing the drawback.

With the progress of the German industry, however, much better results were obtained. During the year ending July 31, 1882, instead of 11.75 quintals of beets, only 10.46 quintals were required to produce 1 quintal of sugar. On the 10.46 quintals of beets a tax of 16.74 marks (\$1.81 per 100 pounds of sugar) was imposed. The quintal of sugar if exported received the regular drawback of 18.80 marks, or 2.06 marks more than the amount of the tax. During 1881-82 exported sugar thus received a bonus of 22 cents ( $= \$2.03 - \$1.81$ )

per 100 pounds in addition to the refundment of the excise. It may be said, in general, that the drawback carried with it a bounty whenever less than 11.75 quintals of beets were required to produce a quintal of sugar.

Owing to the lessened quantity of beets required to produce a quintal of sugar, several changes in the drawback allowance and in the tax rate were made after July 31, 1883, in each case reducing slightly the bounty afforded. These changes are shown in Table 7. But the increased sugar extraction, as shown in Table 8, raised the bounty more rapidly than legislation lowered it. During the season 1887-88 the actual ratio between beets and sugar had fallen to 7.65 to 1, while the legal rate was 10.15 to 1; so that, on the average, the exporter received a virtual bounty of 46 cents per 100 pounds. Of the \$28,000,000 collected from the beet tax in that year, no less than \$25,000,000 was paid out as drawback, leaving only \$3,000,000 as the net receipts from the 875,000,000 pounds of sugar retained for consumption—about 35 cents per 100 pounds. Yet the domestic price of raw sugar was raised about \$2 per 100 pounds above the price of the same sugar for exportation to England.

Conditions demanded some change in the method of sugar taxation. In order to guarantee to the treasury some certain receipts, a new tax amounting to \$1.30 per 100 pounds of sugar (12 marks per quintal), to take effect August 1, 1888, was laid on all sugar for domestic consumption. The beet tax was not repealed, but was reduced from 1.70 marks to 80 pfennig per quintal and the drawback from 17.25 to 8.50 marks per quintal (from \$1.86 to 92-cents per 100 pounds). The legal ratio between beets and sugar was somewhat raised in order to retain an incentive to increased sugar extraction.

On August 1, 1892, the beet tax and the drawback on exportation were definitely abolished, and the consumption tax increased to \$1.94 per 100 pounds (18 marks per quintal) of sugar. The exporter was compensated for the loss of the previous hidden bounty by the payment of a direct bounty much less in amount. The virtual bounty obtained during the preceding four sugar years amounted to about 21 cents per 100 pounds of raw sugar. The new bounty was fixed at 13 cents per 100 pounds (1.25 marks per quintal) on raw sugar, and at somewhat higher rates on refined. The import duties were also increased. While this law was probably somewhat harder to enforce than the preceding, its results could be much more clearly foreseen. The encouragement to the beet industry was further increased by the law of May, 1896, when the direct bounties were about doubled, while the consumption tax and import duties were also slightly increased.



TABLE 7.—*Sugar taxes levied and bounties paid by Germany, 1869–1903.*

[In marks, per 100 kilograms.]

Period.	Import duties.		Internal taxes.		Payments on exportation. <sup>a</sup>		
	Raw. <sup>b</sup>	Refined. <sup>b</sup>	Beet tax.	Con- sumption tax.	Raw.	Refined. Candy and loaf sugar.	Other.
September 1, 1869–August 31, 1883.	24.00	30.00	1.60	.....	c 18.80	23.00	21.60
September 1, 1883–July 31, 1886.	24.00	30.00	1.60	.....	d 18.00	22.20	20.80
August 1, 1886–October 31, 1887.	24.00	30.00	1.70	.....	e 18.00	22.20	20.80
November 1, 1887–July 31, 1888.	24.00	30.00	1.70	.....	f 17.25	21.50	20.15
August 1, 1888–July 31, 1892.	30.00	30.00	.80	12.00	8.50	10.65	10.00
August 1, 1892–May, 1896.	36.00	36.00	.....	18.00	g 1.25	g 2.00	g 1.65
June, 1896–August 31, 1903.	40.00	40.00	.....	h 20.00	i 2.50	i 3.55	i 3.00
September 1, 1903, to date.	18.40	18.80	.....	14.00	.....	.....	.....

[In dollars, per 100 pounds.]

September 1, 1869–August 31, 1883.	2.59	3.24	j 0.17	.....	e 2.03	2.48	2.33
September 1, 1883–July 31, 1886.	2.59	3.24	j .17	.....	d 1.94	2.40	2.25
August 1, 1886–October 31, 1887.	2.59	3.24	k .18	.....	e 1.94	2.40	2.25
November 1, 1887–July 31, 1888.	2.59	3.24	k .18	.....	f 1.86	2.32	2.18
August 1, 1888–July 31, 1892.	3.24	3.24	l .09	1.30	.92	1.15	1.08
August 1, 1892–May, 1896.	3.89	3.89	.....	1.94	g .14	g .22	g .18
June, 1896–August 31, 1903.	4.32	4.32	.....	h 2.16	i .27	i .38	i .32
September 1, 1903, to date.	1.99	2.03	.....	1.51	.....	.....	.....

<sup>a</sup> Prior to August 1, 1892, in the form of drawbacks, and from that date to August 31, 1903, export bounties. Raw sugars comprise sugar testing less than 98° by the polariscope, but not less than 88° prior to August 1, 1886, and 90° subsequently. For earlier years it comprised sugar not below 88°. Candy and loaf sugar since July 31, 1886, includes also other sugar testing not less than 99½°.

<sup>b</sup> Prior to August 1, 1888, raw sugar not below No. 19 Dutch standard was classed with refined.

c To July 31, 1883, inclusive.

d From August 1, 1883.

e To September 30, 1887, inclusive.

f From October 1, 1887.

g To July 31, 1896, inclusive.

<sup>h</sup> In addition to a manufacturing tax of 10 pfennig per 100 kilograms (1 cent per 100 pounds), in the case of factories producing not more than 4,000,000 kilograms (8,818,400 pounds) a year. The rate of tax is raised 2½ pfennig per 100 pounds for every increase in annual production of 1,000,000 kilograms or less. An additional tax of 2.50 marks per 100 kilograms (27 cents per 100 pounds) was collected on all sugar produced by any factory in excess of its official allotment (contingent).

i From August 1, 1896.

k Or \$3.67 per short ton.

j Or \$3.45 per short ton.

l Or \$1.73 per short ton.

TABLE 8.—*Calculations of the virtual bounty afforded by the German drawback on exported sugar.*

Year ending July 31 <sup>a</sup> —	Beets re- quired to pro- duce 1 quintal of sugar.	Tax on beets per quintal.	Tax paid on beets required to pro- duce—		Drawback on raw sugar exported.		Net bounty afforded per 100 pounds of raw sugar.
			1 quintal of raw sugar.	100 pounds of raw sugar.	Per quintal.	Per 100 pounds.	
	<i>Quintals.</i>	<i>Marks.</i>	<i>Marks.</i>	<i>Dollars.</i>	<i>Marks.</i>	<i>Dollars.</i>	<i>Dollars.</i>
1872.	12.07	1.60	19.31	2.08	18.80	2.03	b 0.05
1873.	12.11	1.60	19.38	2.09	18.80	2.03	b .06
1874.	12.12	1.60	19.39	2.09	18.80	2.03	b .06
1875.	10.75	1.60	17.20	1.86	18.80	2.03	.17
1876.	11.62	1.60	18.59	2.01	18.80	2.03	.02
1877.	12.27	1.60	19.63	2.12	18.80	2.03	b .09
1878.	10.82	1.60	17.31	1.87	18.80	2.03	.16
1879.	10.86	1.60	17.38	1.88	18.80	2.03	.15
1880.	11.74	1.60	18.78	2.03	18.80	2.03	.....
1881.	11.37	1.60	18.19	1.96	18.80	2.03	.07
1882.	10.46	1.60	16.74	1.81	18.80	2.03	.22
1883.	10.51	1.60	16.82	1.82	18.80	2.03	.21
1884.	9.49	1.60	15.18	1.64	18.00	1.94	.30
1885.	9.26	1.60	14.82	1.60	18.00	1.94	.34
1886.	8.75	1.60	14.00	1.51	18.00	1.94	.43
1887.	8.43	1.70	14.33	1.55	18.00	1.94	.39
1888.	7.65	1.70	13.01	1.40	17.25	1.86	.46
1889.	8.36	.80	6.69	.72	8.50	.92	.20
1890.	8.09	.80	6.47	.70	8.50	.92	.22
1891.	8.27	.80	6.62	.71	8.50	.92	.21
1892.	8.29	.80	6.63	.72	8.50	.92	.20

<sup>a</sup> Prior to 1881 the years comprise the twelve months ending August 31; 1881 comprises the eleven months ending July 31.

<sup>b</sup> Excess of tax over drawback.



The law of 1896 introduced two new features into the sugar legislation of Germany: (1) In addition to the consumption tax, a new manufacturing tax was imposed, varying in amount according to the annual production of the factory. For a factory producing not more than 4,000,000 kilograms of sugar, the manufacturing tax amounted to 1 cent per 100 pounds (10 pfennig per 100 kilograms). The rate was increased  $2\frac{1}{2}$  pfennig for each increase in annual production of 1,000,000 kilograms or less. (2) In order to prevent overproduction, and thus to limit the amount of bounties, the production of each factory was restricted to an amount officially determined at the beginning of each season. The allotment or contingent was based on the production for preceding campaigns. Any production on the part of a factory above its official allotment was made liable to an additional tax equal to the export bounty on raw sugar. In determining the contingent as well as in the rate of the manufacturing tax, smaller factories were favored somewhat relative to larger ones.

The conspicuous character of the bounty and the possibility of precisely ascertaining its amount undoubtedly contributed very largely to the demands for its repeal. During the sugar year 1901-2 the bounty amounted to nearly \$10,000,000. The magnitude of the bonus obtained previously in the form of the drawback was much less apparent.

A law of January 6, 1903, going into force on September 1, made effective for Germany the general principles of the Brussels Convention. The export bounty was repealed. In view of the saving expected from the repeal of the bounty, the consumption tax was reduced to \$1.51 per 100 pounds (14 marks per quintal). The Brussels Convention provided that the import duties should not exceed the internal tax by more than 5.50 francs per quintal in the case of raw sugar and 6 francs in the case of refined sugar. In accordance with this provision, the German import duty was reduced to \$1.99 per 100 pounds on raw sugar and \$2.03 on refined (18.40 and 18.80 marks per quintal).

#### THE "CARTEL." <sup>a</sup>

Since June, 1900, the sugar production of Germany has been concentrated in the hands of a combination known as the "Sugar Cartel," modeled very closely after a similar organization in Austria-Hungary. The avowed object of the combination was to bring about steadier prices. During the three years preceding the formation of the cartel the difference in price between raw and refined sugar on

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<sup>a</sup> The word cartel indicates a combination, usually for the purpose of regulating prices and output, in which the component corporations or companies retain their separate existence. The cartel is essentially a pool; it differs from the early American trusts in that the cartel managers do not actively manage the affairs of the combined companies, but merely prevent any infringement of the cartel agreement.

the Magdeburg market averaged \$2.93 per 100 pounds. Deducting the internal tax of \$2.16, the net margin was 77 cents per 100 pounds. This net margin, it was seen, could be largely increased without danger of foreign competition.

To take advantage of this opportunity the refiners formed a combination among themselves. It was, however, necessary to make terms with the raw-sugar producers in order to eliminate potential competition. To take advantage of the increased prices offered by the refiners for raw sugar, a combination among the beet factories was also formed, while a third combination was effected by means of contracts between the factories and the refiners. This triple agreement formed the basis of the cartel. Each factory maintained absolute freedom of action, except as to price cutting on the domestic market and as to dealing with outside producers.

The line was clearly drawn in Germany between factories that produced only raw sugar, factories that produced refined sugar from beets, factories that produced refined sugar from purchased molasses, and refineries that purchased their raw sugar from other producers. The last three classes signed the agreements by which the refiners' cartel was organized. The first two classes joined in forming the raw-sugar cartel. Thus the so-called white-sugar factories belonged to both cartels in their dual capacity of producing raw sugar from beets and refined sugar from raw.

The refiners' cartel made an agreement with the raw-sugar cartel covering the following points:<sup>a</sup>

The raw-sugar factories agreed to make directly no refined sugar for the internal market and to sell their product only to members of the refiners' cartel. The refiners agreed to purchase their raw product exclusively from cartel factories. They agreed, moreover, whenever the Magdeburg price fell below \$2.75 per 100 pounds (25.50 marks per quintal), to pay to the cartel for subsequent distribution among the factories the difference, not to exceed 73 cents per 100 pounds (6.80 marks per quintal), between the average price for the month and the normal price of \$2.75.

The cartel advantage to the raw-sugar producers consequently existed only while the Magdeburg price of raw sugar was below \$2.75 per 100 pounds, and increased with every fall in the price down to \$2.02 per 100 pounds (18.70 marks per quintal). When the price ranged below that limit, as it did for much of the time during the operation of the cartel, the cartel advantage was limited to 73 cents, the difference between that quotation and the normal price. For the

<sup>a</sup> Les cartels sucriers en Allemagne et en Autriche, by Georges Dureau (reprint of articles in the *Journal des fabricants de sucre*); Report of the Industrial Commission, Vol. 18, pp. 151-153, 161.

first year of the cartel only one-half and for the second year three-fourths of the amount indicated was to be paid over to the raw-sugar producers. This was owing to the difficulty anticipated in raising the inland price of refined sugar promptly to the new level. It was found feasible, however, to raise the price as soon as the cartel went into existence. From about April 1, 1901, the entire amount of the cartel advantage began to be paid over to the raw sugar cartel.<sup>a</sup>

The cartel was limited in its operation to the home market. Raw sugar factories could at any time sell their sugar abroad instead of to the refiners belonging to the cartel, and could even produce refined sugar for exportation.

It was important to provide against overproduction resulting from the new bonus. For this reason there was allotted to every refiner a definite proportion of the sugar sold on the home market, and that proportion remained invariable during the continuance of the cartel. Similarly, the share of each sugar factory in the total cartel profits was made uniform throughout the duration of the cartel, being proportioned to the official contingent for 1900-1901. If the production of one year had influenced the allotment for a succeeding year there would have been a powerful stimulus to excessive production.

It might appear as if a sugar factory had no interest in obtaining a higher price for its product, since the bonus made up any difference between the normal and the actual price. The bonus paid, however, was not determined by the price in any special instance, but by the average of all sales for each month. The amount of the bonus received by any particular factory was consequently not increased perceptibly by selling its own product at a relatively low price. Moreover, the amount received by the raw sugar cartel from the refiners was distributed among the factories in accordance with their official allotment, not according to individual production or sales. For this reason the cartel, although a purely private combination, was regarded by many as equivalent in its effects to a bounty.

While the advantage of the raw-sugar factories was thus definite, the advantage to the refiners was more or less indefinite, but was perhaps even greater in amount. As was shown above, the margin between raw and refined sugar at Magdeburg, after deduction of the consumption tax, averaged about 77 cents per 100 pounds during the three years ending July 31, 1899. The margin increased to no less than \$1.80 per 100 pounds for the sugar year 1900-1901, \$2.25 for the year 1901-2, and \$2.28 for the year 1902-3. The increase in this margin was undoubtedly the result of combined action on the part of the refiners, and represents the profits of the refiners from the cartel. The advantage of the cartel to refiners may thus be estimated

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<sup>a</sup> Deutsche Zuckerindustrie, 1901, pp. 962-963.

at \$1.03 per 100 pounds of sugar consumed within the Empire for 1900-1901, \$1.48 for 1901-2, and \$1.51 for 1902-3, aggregating about \$62,000,000 during the three years. This represents an average gain of \$1.34 per 100 pounds of sugar consumed within the Empire, or 68 cents per 100 pounds on the total production of refined sugar.

From these profits, of course, are to be deducted the amounts paid over to the raw-sugar syndicate. No authoritative statement is available showing precisely the amount of the cartel bonus thus paid to the raw-sugar factories. An estimate indicates that according to the terms of the contract, the cartel advantage to the raw-sugar factories from August, 1900, to August, 1903, amounted to somewhat less than \$31,000,000. This amount was on the average slightly less than 25 cents per 100 pounds of raw sugar produced.

During the continuance of the cartel some differences arose between the refiners and raw-sugar factories. On September 1, 1903, the cartel was dissolved. During the ensuing year, 1903-4, the difference between the average price of refined sugar and raw sugar on the Magdeburg market was \$2.25 per 100 pounds. Deducting the internal tax of \$1.51, the net margin amounted only to 74 cents, as compared with \$2.11 under the cartel. A new combination was advocated in order to obtain for the factories and the refiners the full advantage of the surtax. The attempt proved unsuccessful, but the refineries maintained a combination among themselves until December 31, 1903.<sup>a</sup>

#### PRICES.

The average price of refined sugar at Magdeburg during 1882-83 was 8.29 cents per pound, and during 1884-85 6.20 cents. From that amount it slowly declined with considerable fluctuations to 5.07 cents in 1897-98, and then rose slightly to 5.39 in 1899-1900. The next year the price rose to 6.20 cents per pound, and in 1902-3 to 6.34 cents. The latter price was higher than in any other year since 1883-84, with the single exception of 1888-89.

Export prices on the contrary have decreased very rapidly during the last decade. The price of German refined sugar, free on board at Hamburg, destined for the London market, was 3.49 cents per pound in 1889-90, and 3.82 cents in 1892-93. Ten years later it had fallen to less than 2 cents per pound.

The decline in the price of raw sugar for exportation was even more marked. From 4.53 cents per pound in 1882-83 the Hamburg free-on-board price of raw sugar fell to 3.29 cents in 1892-93, and to 1.51 cents in 1901-2, but rose again slightly in 1902-3 to 1.67 cents. During the twenty years there was a drop of nearly two-thirds in price.

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<sup>a</sup> *Deutsche Zuckerindustrie*, 1903, pp. 1428-1430, 1801.



The actual fall in the price of raw sugar for domestic use is by no means so great as indicated in Table 9. The prices in that table prior to August 1, 1892, include the beet tax, while the consumption tax, imposed together with the beet tax from August 1, 1888, to July 31, 1892, and exclusively since that time, is included only in the price of refined sugar. This makes the basis of the inland prices of raw sugar from 0.7 cent to 2 cents a pound higher than for subsequent years.

TABLE 9.—Average price of sugar, sugar beets, and molasses in Germany, 1883-1904.

Year ending July 31—	Raw sugar, 88 per cent.			Refined sugar.			Difference between raw and refined at Magdeburg.	Beets, factory price.	Molasses for distillation at Magdeburg.
	At Magdeburg. <i>a</i>	Hamburg f. o. b. for export.	Excess of domestic price.	First loaf at Magdeburg. <i>b</i>	Granulated Hamburg f. o. b.	Excess of domestic price.			
	Cents per pound.	Cents per pound.	Cents per pound.	Cents per pound.	Cents per pound.	Cents per pound.	Cents per pound.	Dols. per short ton.	Cents per pound.
1883.....	6.63	4.53	2.10	8.29	(c)	(c)	1.66	3.89-5.61	0.94
1884.....	5.80	3.77	2.03	7.39	(c)	(c)	1.59	3.89-5.61	.78
1885.....	4.78	2.72	2.06	6.20	(c)	(c)	1.42	3.02-3.45	.56
1886.....	5.03	2.97	2.06	6.32	(c)	(c)	1.29	3.02-3.89	.61
1887.....	4.46	2.47	1.99	5.68	(c)	(c)	1.22	3.24-3.89	.60
1888.....	5.01	2.97	2.04	6.23	(c)	(c)	1.22	3.45-4.10	.53
1889.....	4.50	3.64	.86	6.75	(c)	(c)	2.25	3.89-4.32	.59
1890.....	3.64	2.77	.87	6.06	3.49	2.57	2.42	3.67-4.75	.43
1891.....	3.83	2.88	.95	6.12	3.36	2.76	2.29	3.89-4.75	.42
1892.....	3.98	2.95	1.03	6.23	3.41	2.82	2.25	3.89-4.75	.53
1893.....	3.40	3.29	.11	6.21	3.82	2.39	2.81	4.51	.53
1894.....	2.94	2.81	.13	5.76	3.34	2.42	2.82	4.58	.43
1895.....	2.26	2.14	.12	4.91	2.57	2.34	2.65	4.36	.22
1896.....	2.45	2.37	.08	5.22	2.78	2.44	2.77	3.82	.21
1897.....	2.11	1.95	.16	5.09	2.36	2.73	2.98	3.82	.24
1898.....	2.17	1.98	.19	5.07	2.38	2.69	2.90	3.74	.41
1899.....	2.37	2.18	.19	5.27	2.53	2.74	2.90	3.95	.52
1900.....	2.36	2.18	.18	5.39	2.55	2.84	3.03	4.12	.57
1901.....	2.24	2.12	.12	6.20	2.51	3.69	3.96	4.25	.65
1902.....	1.71	1.51	.20	6.12	1.87	4.25	4.41	4.08	.45
1903 <sup>d</sup> .....	1.90	1.67	.23	6.34	1.96	4.38	4.44	3.86	.44
1904 <sup>e</sup> .....	1.88	1.89	f.01	4.13	2.31	1.82	2.25	(c)	.64

*a* Including the beet tax, which was imposed prior to 1893, but not the consumption tax imposed after 1888.

*b* Including tax.

*c* Data not available.

*d* Thirteen months ending August 31, 1903.

*e* Year ending August 31, 1904.

*f* Excess of export price.

The difference between the Magdeburg price for domestic consumption and the Hamburg price for exportation follows quite closely the amount of the drawback prior to 1892-93 and the export bounty subsequently.

The difference between the domestic price for refined and raw sugar is also shown. To ascertain the net margin it is necessary to deduct since July, 1888, the consumption tax which was included in the price of refined, but not in the price of raw sugar. The net margin thus obtained shows a gradual decrease prior to the organization of the sugar cartel and then a marked increase until 1903-4.

Prices for the sugar year 1903-4 bring out clearly the important results of the Brussels Convention. For raw sugar the export price actually exceeded the inland price, the former showing a considerable increase and the latter a material decline as compared with prices in



the sugar year 1902-3. The average inland price of refined sugar fell 2 cents, of which little more than one-half cent was due to the reduction of the consumption tax. The difference between the inland and the export price of refined sugar was halved, and the net margin between raw and refined sugar at Magdeburg was reduced from 2.28 cents to 0.74 cent per pound.

#### ACREAGE AND PRODUCTION OF BEETS.

The sugar-beet area in Germany increased from 434,000 acres in 1878 to 1,183,000 acres in 1901. The quantity of beets produced increased from 2,500,000 short tons for the sugar year 1871-72 to 17,700,000 short tons for 1901-2. In 1902-3 and 1903-4 there was a considerable reduction, both in acreage and production, as compared with 1901-2.

The beet tax undoubtedly afforded a great incentive to the selection of plants and their cultivation with regard to sugar content rather than to tonnage. The less the weight of the beets required to produce a given quantity of sugar, the smaller the tax paid by the factories. By improved methods of cultivation the sugar matter obtained per acre has increased much faster than the average yield indicates.

Unfortunately, prior to 1892-93 the statistics of acreage and the average yields shown in Table 10<sup>a</sup> relate only to factory-grown beets, including those grown by stockholders in cooperative factories. The average yields thus shown are considerably higher than the average yield for all beet growers. For the later years the statistics relate to the entire beet-growing industry. The area given in the table is that from which the beets used for sugar making were harvested.

A considerable change has taken place since 1871-72 in regard to the relative quantity of beets grown by the factories themselves and the quantity purchased from others. Down to 1883 the factories continually grew more than they purchased. In 1901-2, however, nearly 60 per cent of the entire quantity used was purchased, while less than 10 per cent was grown directly by the factories and 30 per cent by stockholders in cooperative factories. The shortage in the crop for the 1902-3 factory year affected principally independent beet growers, who furnished but 52 per cent of the beets worked.

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<sup>a</sup>The data in Tables 10-12 were taken from Monatshefte and Vierteljahrshefte zur Statistik des Deutschen Reichs and Monatliche Nachweise über den auswärtigen Handel des deutschen Zollgebiets.

TABLE 10.—*Acreage and production of sugar beets in Germany, 1872-1904.*

Factory year ending July 31 <i>a</i> —	Area. <i>b</i>	Beets used in factories.				Average yield per acre. <i>b</i>
		Total.	Grown by factories.	Grown by stock- holders.	Purchased.	
	<i>Acres.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1872.....	182,088	2,481,187	1,658,246	( <i>c</i> )	822,941	9.11
1873.....	204,080	3,507,023	2,316,265	( <i>c</i> )	1,190,758	11.35
1874.....	219,615	3,889,756	2,668,567	( <i>c</i> )	1,221,189	12.15
1875.....	228,951	3,038,760	2,103,293	( <i>c</i> )	935,467	9.19
1876.....	239,005	4,586,984	3,126,461	( <i>c</i> )	1,460,523	13.08
1877.....	243,949	3,913,205	2,744,896	( <i>c</i> )	1,168,309	11.25
1878.....	258,919	4,509,474	3,166,660	( <i>c</i> )	1,342,814	12.23
1879.....	266,075	5,102,269	3,432,595	( <i>c</i> )	1,669,674	12.90
1880.....	279,230	5,296,840	3,142,201	( <i>c</i> )	2,154,639	11.25
1881.....	292,643	6,968,964	4,267,751	( <i>c</i> )	2,701,213	14.58
1882.....	299,624	6,913,568	3,782,822	( <i>c</i> )	3,130,746	12.63
1883.....	319,406	9,641,988	4,903,727	( <i>c</i> )	4,738,261	15.35
1884.....	348,023	9,830,455	4,635,242	( <i>c</i> )	5,195,213	13.32
1885.....	370,840	11,466,883	5,441,224	( <i>c</i> )	6,025,659	14.67
1886.....	343,145	7,793,610	4,628,610	( <i>c</i> )	3,165,000	13.49
1887.....	365,169	9,156,444	4,889,895	( <i>c</i> )	4,266,549	13.39
1888.....	355,461	7,676,374	4,186,152	( <i>c</i> )	3,490,222	17.78
1889.....	369,195	8,703,963	4,640,619	( <i>c</i> )	4,063,344	12.57
1890.....	383,040	10,827,491	5,614,049	( <i>c</i> )	5,213,442	14.66
1891.....	392,884	11,710,085	5,641,212	( <i>c</i> )	6,068,873	14.36
1892.....	407,157	10,458,625	5,119,207	( <i>c</i> )	5,339,418	12.57
1893.....	869,829	10,815,701	1,666,496	3,640,610	5,508,595	12.43
1894.....	954,995	11,733,269	1,420,461	3,927,268	6,385,540	12.29
1895.....	1,090,801	16,006,531	2,017,455	4,648,198	9,340,878	14.67
1896.....	930,749	12,866,945	1,642,219	4,011,639	7,213,087	13.82
1897.....	1,049,881	15,125,321	1,927,605	4,445,950	8,751,766	14.41
1898.....	1,080,257	15,099,186	1,719,277	4,825,103	8,554,806	13.98
1899.....	1,053,778	13,393,653	1,562,030	4,697,498	7,134,125	12.71
1900.....	1,054,455	13,711,841	1,456,839	4,960,667	7,294,335	13.00
1901.....	1,106,034	14,609,784	1,435,926	5,121,456	8,052,402	13.21
1902.....	1,182,989	17,650,983	1,554,236	5,735,863	10,360,884	14.92
1903.....	1,056,708	12,423,999	1,214,881	4,684,791	6,524,327	11.76
1904.....	1,027,580	14,006,404	( <i>d</i> )	( <i>d</i> )	( <i>d</i> )	13.63

*a* Prior to 1881 and in 1904 the years comprise the twelve months ending August 31; 1881 comprises the eleven months ending July 31, and 1903 the thirteen months ending August 31.

*b* Prior to 1893 the returns of area and of average yield apply only to the beets grown by factories. The total area planted in 1878 (for the 1878-79 factory year) was 434,400 acres, and in 1883 (for the 1883-84 factory year) 811,000 acres. See *Vierteljahrshefte*, 1902, III, pp. 125-193. In 1904 (for the 1904-5 factory year) 1,024,976 acres were planted in beets.

*c* Included with beets grown by factories.

*d* No data available.

#### SUGAR PRODUCTION.

For statistical purposes the sugar factories and refineries of Germany are divided into three distinct classes: (1) Beet factories, some of which produce refined as well as raw sugar; (2) molasses factories; (3) refineries. Prior to the 1886-87 season the official statistics cover only the first class. The omission of returns covering molasses factories and refineries does not seriously impair the completeness of earlier figures, for in 1886-87 the total production is raised only 72,000,000, or about 3 per cent, by including the output of molasses factories and refineries. Refineries simply transform sugar from raw to refined, and hence do not increase the net production. It is different with molasses factories, which utilize what would otherwise be a waste product so far as sugar making is concerned. But the output of such factories was formerly small relative to the total sugar production. By 1902-3 it had increased to 317,000,000 pounds, or over 8 per cent of the total sugar output. A special increase in the official allotment was permitted to facilitate the erection of molasses factories.

TABLE 11.—*Production of sugar in Germany.*<sup>a</sup>

Year ending July 31 <sup>b</sup>	Factories and refineries. <sup>a</sup>	Raw materials.		Sugar produced.			Average extraction.	
		Beets.	Sugar melted, in terms of raw sugar.	Total. <sup>c</sup>	Raw. <sup>d</sup>	Refined.	Per short ton of beets.	Per cent of beets.
	No.	Short tons.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Percent.
1872.....	311	2,481,187	(e)	411,029,800	(e)	(e)	166	8.28
1873.....	324	3,507,023	(e)	578,820,200	(e)	(e)	165	8.25
1874.....	337	3,889,756	(e)	641,628,300	(e)	(e)	165	8.25
1875.....	333	3,038,760	(e)	565,286,800	(e)	(e)	186	9.30
1876.....	332	4,586,984	(e)	789,353,100	(e)	(e)	172	8.60
1877.....	328	3,913,205	(e)	638,061,300	(e)	(e)	163	8.15
1878.....	229	4,509,474	(e)	833,358,900	(e)	(e)	185	9.24
1879.....	324	5,102,269	(e)	939,501,500	(e)	(e)	184	9.21
1880.....	328	5,296,840	(e)	902,596,700	(e)	(e)	170	8.52
1881.....	333	6,968,964	(e)	1,225,570,400	(e)	(e)	176	8.79
1882.....	343	6,913,568	(e)	1,322,147,600	(e)	(e)	191	9.56
1883.....	358	9,641,988	(e)	1,834,216,800	(e)	(e)	190	9.51
1884.....	376	9,830,455	(e)	2,072,565,000	(e)	(e)	211	10.54
1885.....	408	11,466,883	(e)	2,475,832,600	(e)	(e)	216	10.80
1886.....	399	7,793,610	(e)	1,781,548,100	(e)	(e)	229	11.43
1887.....	456	9,156,444	1,244,453,900	2,244,903,600	895,127,800	1,188,823,500	245	12.26
1888.....	446	7,676,374	1,262,085,400	2,113,910,500	745,665,000	1,245,576,300	275	13.77
1889.....	449	8,703,963	1,263,841,800	2,184,518,100	810,217,900	1,234,901,600	251	12.55
1890.....	459	10,827,491	1,569,585,300	2,780,779,700	1,084,195,800	1,497,393,900	257	12.84
1891.....	465	11,710,085	1,678,236,500	2,945,833,700	1,099,812,600	1,655,063,100	252	12.58
1892.....	461	10,458,625	1,592,223,200	2,641,167,500	894,301,500	1,589,632,300	253	12.63
1893.....	466	10,815,701	1,651,042,800	2,713,498,200	838,474,900	1,687,521,000	251	12.54
1894.....	468	11,733,269	1,792,040,000	3,011,486,500	1,008,920,800	1,802,309,000	257	12.83
1895.....	467	16,006,531	2,124,978,200	4,029,950,400	1,605,228,600	2,182,249,800	252	12.59
1896.....	458	12,866,945	2,282,341,300	3,609,056,500	952,770,100	2,390,657,700	280	14.02
1897.....	456	15,125,321	2,104,174,500	4,015,068,700	1,553,377,300	2,215,322,200	265	13.27
1898.....	458	15,099,186	2,560,353,200	4,066,163,400	1,108,691,800	2,661,724,500	269	13.46
1899.....	457	13,393,653	2,462,488,600	3,797,267,200	892,285,600	2,614,483,400	284	14.18
1900.....	453	13,711,841	2,486,252,600	3,958,311,900	981,601,100	2,679,039,800	289	14.43
1901.....	448	14,609,784	2,639,069,800	4,363,164,200	1,197,928,300	2,848,712,300	299	14.93
1902.....	447	17,650,983	2,703,807,900	5,075,532,400	1,779,783,000	2,966,174,400	288	14.38
1903.....	444	12,423,999	2,972,896,900	3,944,183,700	369,374,100	3,217,328,600	317	15.87
1904.....	(e)	14,006,404	2,868,889,200	4,253,588,100	796,949,900	3,110,974,300	304	15.18

<sup>a</sup> Prior to 1887 statistics relate to beet factories only.<sup>b</sup> Prior to 1881 and in 1904 the years comprise the twelve months ending August 31; 1881 comprises the eleven months ending July 31, and 1903 the thirteen months ending August 31.<sup>c</sup> Expressed in terms of raw sugar, after deducting the sugar melted. Refined sugar is reduced to raw at the rate of 90 pounds of refined to 100 pounds of raw.<sup>d</sup> Exclusive of sugar melted for refining.<sup>e</sup> No data available.

Since the sugar year 1871-72 the number of beet factories has increased but slightly. In that year, as shown in Table 11, the number was 311, while in 1902-3 the number was 393, in addition to 6 molasses factories and 45 refineries. During the same time the tonnage of beets increased fivefold and the production of sugar nearly tenfold. In 1901-2 the tonnage of beets was seven times and the quantity of sugar produced over twelve times the production for 1871-72. In the thirty years intervening the production of sugar had increased from 411,000,000 pounds to more than 5,000,000,000 pounds. The marked decline of over a billion pounds in 1902-3 was due partly to restricted acreage on account of the immense stock of sugar that had accumulated and the doubt felt as to the effect of the Brussels Convention, and partly to an extremely low average yield of beets. In 1871-72 each beet factory on the average worked 8,000 short tons of beets and produced 1,322,000 pounds of sugar; in 1901-2 each beet factory

worked 45,000 tons of beets and obtained over 12,000,000 pounds of sugar.

During the first five sugar years the average quantity of sugar extracted was 8.54 per cent of the weight of beets. During the period from August 1, 1882, to July 31, 1887, 10.91 per cent was obtained. During the five sugar years 1897-98 to 1901-2, the yield had increased to 14.28 per cent. In 1902-3 there was an average extraction of 15.87 per cent and in 1903-4 15.18 per cent. These results may be made clearer by stating the average quantity of raw sugar obtained from each short ton of beets. In 1871-72 to 1875-76, the sugar extracted averaged 171 pounds per short ton of beets; in 1882-83 to 1886-87, 218 pounds per short ton; in 1897-98 to 1901-2, 286 pounds per short ton; in 1902-3, 317 pounds, and in 1903-4, 304 pounds per short ton.

An increasing proportion of the sugar output since 1886 has been refined. In 1886-87, 895,000,000 pounds of raw sugar were produced above the amount subsequently melted for refining, while in 1902-3 only 369,000,000 pounds remained unrefined. Refined sugar constituted about 60 per cent of the total production in 1886-87, as compared with 65 per cent in 1901-2, 90 per cent in 1902-3, and 81 per cent in 1903-4. The proportion of refined sugar in 1902-3 was exaggerated because, owing to the small total sugar production, an exceptionally large part was retained for domestic use, nearly all of which consisted of refined.

#### FOREIGN TRADE IN SUGAR.

Until 1875 the German sugar industry was unable fully to supply the internal market. In 1871-72 Germany imported 78,000,000 pounds of sugar more than it exported. In 1875-76 for the first time Germany's sugar exports exceeded the imports and Germany took its place among the sugar-exporting nations. After that time the imports became inconsiderable, while the exports increased to more than 2,500,000,000 pounds annually, and then declined in 1903-4 to 1,900,000,000 pounds. (See Table 12.)

Within five years from the time a surplus production first appeared, the quantity exported became larger than the quantity retained for internal use. For the last twenty years, consequently, the chief problem confronting the German sugar industry has been to find profitable markets abroad. During the campaigns 1882-83 to 1886-87 about 61 per cent of the entire domestic production was shipped abroad. Since that time the increase in domestic consumption and in exportation proceeded at about the same rate. The proportion of the domestic product exported during the five years 1898-99 to 1902-3 was about 58 per cent, but in 1903-4 fell to 46 per cent.



TABLE 12.—*Sugar imports and exports of Germany, 1872-1904.*

Year ending July 31— <sup>a</sup>	Imports. <sup>b</sup>	Exports.				
		Total. <sup>c</sup>	Raw. <sup>d</sup>	Refined.		Without drawback or bounty.
				Candy and hard loaf. <sup>e</sup>	Other. <sup>f</sup>	
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
1872.....	109,421,400	31,472,200	12,492,400	9,207,100	3,599,700	4,275,600
1873.....	59,712,000	39,546,600	18,028,600	11,316,400	6,276,900	1,773,200
1874.....	63,829,800	47,740,600	26,034,600	9,065,300	5,800,300	4,669,800
1875.....	61,046,900	23,839,200	6,357,600	8,697,600	3,386,000	3,644,400
1876.....	46,854,800	123,724,100	101,178,400	10,389,200	5,584,000	4,318,400
1877.....	27,570,700	133,056,000	101,894,200	16,299,700	9,573,000	2,173,100
1878.....	19,583,500	213,357,900	156,969,700	30,867,300	18,389,900	1,491,200
1879.....	17,572,900	304,404,100	228,113,900	42,672,500	25,124,900	494,500
1880.....	14,515,500	296,487,200	209,793,300	55,636,200	21,396,100	457,000
1881.....	12,361,900	625,894,500	488,191,000	77,995,900	45,594,200	232,800
1882.....	12,639,000	693,148,900	559,816,300	87,998,800	31,774,900	135,600
1883.....	14,553,000	1,041,786,800	861,343,200	108,865,600	53,391,200	142,400
1884.....	11,852,200	1,313,532,400	1,082,846,800	141,638,700	65,846,500	131,600
1885.....	11,692,100	1,485,299,400	1,120,892,300	167,583,600	70,294,100	88,800
1886.....	12,289,500	1,103,008,800	890,816,000	145,546,800	45,346,200	80,500
1887.....	10,327,000	1,457,512,600	1,079,548,700	287,433,300	52,652,000	91,300
1888.....	16,113,600	1,134,745,500	759,949,400	291,476,300	45,731,800	120,400
1889.....	11,691,700	1,349,766,100	909,230,400	361,889,100	34,503,300	99,900
1890.....	11,737,300	1,640,544,100	1,088,699,600	475,612,900	20,925,400	135,100
1891.....	17,486,400	1,653,949,300	1,076,374,800	508,266,800	11,487,300	70,100
1892.....	24,229,200	1,527,592,300	962,686,400	494,240,700	14,134,100	45,000
1893.....	5,104,500	1,600,888,100	936,392,200	583,540,900	13,040,000	1,628,300
1894.....	2,566,400	1,605,659,600	962,692,600	562,365,900	13,792,400	2,791,000
1895.....	3,038,800	2,306,106,800	1,344,062,200	836,162,500	27,415,700	2,513,200
1896.....	3,133,800	2,112,289,900	1,112,098,800	878,820,600	19,437,500	2,126,600
1897.....	3,378,600	2,728,239,700	1,676,944,600	893,115,000	46,716,800	2,160,900
1898.....	2,863,300	2,296,754,900	1,055,873,800	1,055,589,800	55,369,900	2,315,700
1899.....	2,646,200	2,227,302,300	1,101,423,900	962,936,700	43,709,500	2,400,600
1900.....	2,731,300	2,152,052,300	1,071,291,400	920,217,200	46,781,200	1,244,700
1901.....	2,970,300	2,522,614,200	1,175,648,400	1,171,304,000	35,310,200	1,103,400
1902.....	4,231,700	2,681,865,900	1,139,887,500	1,321,954,200	60,921,700	496,500
1903.....	4,719,800	2,599,486,800	998,226,100	1,383,915,400	49,246,600	1,830,500
1904 <sup>g</sup> .....	15,128,600	1,946,264,100	940,683,000	905,023,800	( <sup>h</sup> )	( <sup>h</sup> )

<sup>a</sup> Prior to 1881 and in 1904 the years comprise the 12 months ending August 31; 1881 comprises the 11 months ending July 31, and 1903 the 13 months ending August 31.

<sup>b</sup> Expressed in terms of raw sugar. Prior to 1897 including molasses and sirup, reduced at the rate of 182 pounds to 100 pounds of raw sugar.

<sup>c</sup> Expressed in terms of raw sugar. Prior to 1889 sugar without export bounty is reduced as if refined sugar; in 1889 and subsequent years it is treated as if raw sugar. Since 1896 including also the sugar contained in exported preserves, confectionery, and similar products.

<sup>d</sup> Prior to 1887 testing not below 88° by the polariscope; in 1887 and subsequent years not below 90°. Including refined sugar less than 98° but not less than 90°, at least since July 31, 1886.

<sup>e</sup> Testing not below 99½° by the polariscope; since 1886 including granulated sugar; in 1904 comprising all refined sugar.

<sup>f</sup> Testing not less than 98° by the polariscope.

<sup>g</sup> Preliminary returns from Deutsche Zuckerindustrie, 1904, pp. 1557-1558.

<sup>h</sup> Included in "Candy and hard loaf."

### AUSTRIA-HUNGARY.

For the last twenty years Austria-Hungary has usually stood second to Germany among the beet-sugar countries of Europe. In a few years the output of French factories was larger than that of Austro-Hungarian factories, and in 1902-3 and 1903-4 Russia surpassed Austria-Hungary.

#### AREA DEVOTED TO SUGAR BEETS.

The proportion of the total area of arable land planted in sugar beets is somewhat greater in Austria than in Germany. During the five years 1898-1902 the total arable land in Austria amounted on the average to 26,000,000 acres, of which 564,000 acres, or slightly more



than 2 per cent, were devoted to sugar beets.<sup>a</sup> In Hungary a very much smaller part of the total land surface is used in beet culture. In 1900 the total arable land in Hungary amounted to 33,000,000 acres, while the area in sugar beets was only 230,000 acres, or considerably less than 1 per cent of the total.<sup>b</sup>

#### LOCALIZATION OF THE CROP.

The principal part of the Austrian beet crop is grown in the provinces of Bohemia and Moravia, which are situated in the northwestern part of the Empire, immediately adjoining the German province of Silesia. Both in Moravia and Bohemia the proportion of the total cultivated area devoted to sugar beets amounted to over 5 per cent of the total during the five years 1898-1902. In many districts of these provinces, the proportion was much higher, amounting to 17 per cent in the Olmütz district of Moravia, and 16 per cent in the Prague district of Bohemia.

The most important sugar beet area of Hungary is located immediately to the southeast of Moravia and north of the Danube River. In that province about 3 per cent of the total area of arable land in 1900 was devoted to sugar beets, while in one district, Nyitra, the proportion was 6 per cent. In the district of Sopron, south of the Danube, about 6 per cent of the entire arable land was planted in beets, and in Brasso, in eastern Hungary, about 5 per cent.

Of the total sugar production of Austria-Hungary, Bohemia alone furnished nearly one-half and Moravia somewhat more than one-fourth. The preponderance of Bohemia over Moravia was due entirely to the larger size of the former province, since in Moravia the proportion of the total area of arable land devoted to beets was even greater than in Bohemia. Austria, outside of the two provinces named, produced only about 5 per cent of the entire output of Austria-Hungary, while Hungary, as a whole, furnished about 20 per cent.

#### LEGISLATION.

As in Germany, the tax formerly imposed on the Austro-Hungarian sugar industry took the form of a tax on beets. It was not based, however, on the actual quantity of the beets used by each factory, but on the estimated capacity of the factory, which undoubtedly fell much below the real capacity. A powerful incentive was present to increase the efficiency of the plant without correspondingly increasing its nominal capacity. The beet tax remained in force down to July 31,

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<sup>a</sup> Statistisches Jahrbuch des K. K. Ackerbau-Ministeriums, 1898-1902.

<sup>b</sup> Ungarisches statistisches Jahrbuch, 1900.

1888. Its amount was fixed at 14 cents<sup>a</sup> per 100 pounds (80 kreutzers per quintal) on the estimated consumption of beets.

To facilitate exportation, drawbacks were paid. The rates of the drawback were fixed at \$1.50 per 100 pounds (8.40 florins per quintal) on exported sugar testing less than 93°, but not less than 88°, by the polariscope; at \$1.68 per 100 pounds (9.40 florins per quintal) on sugar testing less than 99.5°, but not less than 93°; and at \$2.06 per 100 pounds (11.55 florins per quintal) on sugar testing not less than 99.5°.

The drawback, as will be seen, was based on the assumption that it required 11.75 quintals of beets to produce one quintal of raw sugar between 93° and 99.5° polariscopic test—precisely the legal equivalent used in Germany. There was an even greater incentive to the exportation of Austro-Hungarian sugar, because the tax was not collected on the full amount of beets worked. In 1875-76 the drawbacks actually exceeded the entire beet tax. Beginning with 1878-79 a minimum limit of net receipts was fixed by law. The limit was placed at 6,000,000 florins for the first factory year and was to be increased 500,000 florins each year until 10,500,000 florins was reached. In 1880-81, however, a new minimum of 10,000,000 florins was fixed, and was increased 400,000 florins each year until, for the year 1887-88, the amount of 12,800,000 florins was reached. In case the factory tax, increased by the import duties, did not afford the required surplus over the drawbacks, a further tax was levied on each factory, according to its estimated capacity. An excess of receipts in one sugar year, as in 1882-83, was carried forward to the next so as to lessen the supplemental tax for that year. In this way the encouragement to exportation was maintained at the expense of the entire sugar industry.

Owing to the complicated system of taxation, the amount of the encouragement to exportation can not be ascertained precisely.

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<sup>a</sup> Prior to the law of August 2, 1892, the monetary standard of Austria-Hungary was the silver florin. The value of the florin was subject to considerable fluctuations, but owing to its limited coinage remained considerably in excess of the value of its pure silver content. The following values, calculated from the exchange rate on London by the Austrian Statistical Central Commission, have been used in making conversions to United States money: For 1883, 40.6 cents; for 1884, 39.9 cents; for 1885, 39.0 cents; for 1886, 38.6 cents; for 1887, 38.4 cents; for 1888, 39.2 cents; for 1889, 40.7 cents; for 1890, 41.9 cents; for 1891, 41.7 cents; for 1892, 40.8 cents. In converting returns for the sugar year 1882-83, the average value for the calendar year 1883 has been used, and similarly for later years.

In August, 1892, the gold crown, valued at 20.3 cents, was made the standard, and the value of the florin was fixed at 2 crowns.

In converting the rate of tax and drawback prior to August 1, 1888, the florin has been taken as equivalent to 39.3 cents, that being its average value for the preceding six years. The rate of later taxes and bounties has been converted uniformly at the value fixed by the law of 1892.

Table 13<sup>a</sup> shows the amount of receipts from the beet tax and from the supplementary payments, as well as the amount of drawbacks paid on exportation.

TABLE 13.—*Taxes collected on beets and drawbacks paid on exported sugar in Austria-Hungary, 1883-1888.*

Year ending July 31—	Legal minimum.	Receipts from domestic industry.					Import duty.	Drawbacks.	
		Beet tax.	Supple- mental tax. <sup>a</sup>	Total.		Per 100 lbs. <sup>b</sup>			
	<i>Florins.</i>	<i>Florins.</i>	<i>Florins.</i>	<i>Florins.</i>	<i>Dollars.</i>	<i>Dollars.</i>	<i>Florins.</i>	<i>Florins.</i>	<i>Dollars.</i>
1883....	10,800,000	39,090,563	.....	39,090,563	15,870,769	1.46	10,593	27,563,813	11,190,908
1884....	11,200,000	33,476,543	1,809,998	35,286,541	14,079,330	1.36	8,782	24,832,666	9,908,234
1885....	11,600,000	34,721,521	12,045,041	46,766,562	18,238,959	1.27	7,112	35,173,674	13,717,733
1886....	12,000,000	20,920,812	10,937,188	31,858,000	12,297,188	1.51	7,085	19,865,085	7,667,923
1887....	12,400,000	34,296,700	7,195,826	41,492,526	15,933,130	1.31	6,155	29,098,681	11,173,894
1888....	12,800,000	25,810,610	6,963,389	32,773,999	12,847,408	1.46	5,947	19,979,946	7,832,139

<sup>a</sup> Required in order to bring the net receipts up to the legal minimum; collected during the following year.

<sup>b</sup> Of sugar produced; see Table 17.

From these data, together with commercial estimates of the sugar output, it is estimated that the average tax per 100 pounds of raw sugar was about \$1.46 in 1882-83, \$1.36 in 1883-84, \$1.27 in 1884-85, \$1.51 in 1885-86, \$1.31 in 1886-87, and \$1.46 in 1887-88, averaging for the six years \$1.38 per 100 pounds. The drawback on exportation remained constant at \$1.68 per 100 pounds of raw sugar of the usual grade. The average excess of the drawback over the tax collected, which measures roughly the virtual export bounty granted, was thus 30 cents per 100 pounds.

Beginning with August 1, 1889, the sugar legislation of Austria was materially modified. A consumption tax on sugar was introduced in place of the old beet tax. The rate was first fixed at \$2.03 per 100 pounds (11 florins per quintal). It was subsequently raised to \$2.39 per 100 pounds (13 florins per quintal) to take effect August 1, 1896, and then to \$3.50 per 100 pounds (19 florins per quintal) to take effect August 1, 1899.

In place of the former drawbacks direct export bounties were granted, but their total amount was limited to 5,000,000 florins for the sugar years 1888-89 to 1895-96, 9,000,000 florins for 1896-97 to 1901-2, and 10,500,000 florins for 1902-3. In case the entire amount of bounties paid out exceeded the maximum limit, restitution was made, not directly according to the bounties received, but according to the quantity of sugar produced, with certain modifications in favor of the smaller producers.

The rates of the bounty were originally fixed at 28 cents per 100 pounds (1.50 florins per quintal) of sugar polarizing less than 93°, but not less than 88°; 29 cents per 100 pounds (1.60 florins per quintal) of

<sup>a</sup> Compiled from apparently official data in Stammer's *Jahres-Bericht über die Zuckerfabrikation*, Vol. 28, pp. 338-339; see, also, *Beet-Sugar Industry and Flax Cultivation in Foreign Countries*, Special Consular Report, 1891, p. 467.

sugar polarizing less than 99.5°, but not less than 93°; and 42 cents per 100 pounds (2.30 florins per metric quintal) on sugar testing not less than 99.5°. On August 1, 1899, the bounty was withdrawn from sugar testing less than 90°, the rate of 29 cents per 100 pounds was applied to sugar testing less than 99.3°, and that of 42 cents to sugar of a higher test, but the maximum amount of the bounty was not changed.

The effect of the maximum limit to the amount of bounties was the practical imposition of a supplemental tax on production. The average amount of such tax is readily ascertained in a rough way by dividing the total quantity of raw sugar produced into the total sum to be recovered—or, in other words, into the excess of the actual bounties paid over their legal limit. In Table 14 such a computation has been made. It is there shown that the net export bounty on raw sugar varied between 28 cents per 100 pounds in 1888–89 and 18 cents per 100 pounds in 1901–2, or from 4 to 38 per cent below the rate fixed by law. The direct bounties, it will be noted, were as a rule lower than the indirect bounties previously obtained in the form of drawbacks.

TABLE 14.—*Excess of export bounties above the maximum legal limit,<sup>a</sup> repaid by additional tax, 1889–1903.*

Year ending July 31—	Amount. <sup>b</sup>		Average per 100 pounds of raw sugar produced.	Net bounty per 100 pounds of raw sugar exported.	Year ending July 31—	Amount. <sup>b</sup>		Average per 100 pounds of raw sugar produced.	Net bounty per 100 pounds of raw sugar exported.
	<i>Florins.</i>	<i>Dollars.</i>				<i>Florins.</i>	<i>Dollars.</i>		
1889.....	323, 116	131, 508	1	28	1897.....	2, 120, 211	860, 806	4	25
1890.....	2, 828, 295	1, 185, 056	7	22	1898.....	1, 171, 223	475, 517	3	26
1891.....	3, 765, 259	1, 570, 113	9	20	1899.....	5, 045, 231	2, 048, 364	9	20
1892.....	3, 677, 628	1, 500, 472	9	20	1900.....	5, 023, 800	2, 039, 663	8	21
1893.....	4, 140, 617	1, 681, 091	10	19	1901.....	5, 188, 769	2, 106, 640	9	20
1894.....	4, 699, 903	1, 908, 161	10	19	1902.....	7, 629, 336	3, 097, 510	11	18
1895.....	4, 062, 734	1, 649, 470	7	22	1903 <sup>c</sup> .....	6, 435, 944	2, 612, 993	11	18
1896.....	4, 673, 935	1, 897, 618	11	18					

<sup>a</sup> For sugar years 1888–89 to 1895–96, 5,000,000 florins; for 1896–97 to 1901–02, 9,000,000 florins; for 1902–3, 10,500,000 florins.

<sup>b</sup> Prior to 1900–1901, according to *Primes sucrières*, p. 428. For later years estimated from data in *Statistische Uebersichten betreffend den auswärtigen Handel des österr.-ungar. Zollgebiets*. (See Table 19.)

<sup>c</sup> Thirteen months ending August 31.

The import duty prior to August 1, 1899, was fixed at \$2.76 per 100 pounds (15 florins per quintal) for raw sugar below No. 19 Dutch standard in color and at \$3.68 per 100 pounds (20 florins per quintal) for raw sugar not below No. 19 Dutch standard and for refined sugar. On that date the duty on raw sugar below No. 19 Dutch standard was changed to \$1.10 per 100 pounds (6 florins per quintal), and on refined sugar to \$2.03 per 100 pounds (11 florins per quintal), in addition to the consumption tax of \$3.50 per 100 pounds.



The law of January 31, 1903, in accordance with the provisions of the Brussels Convention, abolished bounties after August 31, 1903. The duties on foreign sugar were reduced to 41 cents per 100 pounds of raw sugar and 44 cents per 100 pounds of refined (2.20 and 2.40 florins, respectively, per quintal) in addition to the consumption tax, the rate of which was unchanged. A second law provided for an apportionment of the output of individual factories, but that law was decided by the permanent international commission to be inconsistent with the Brussels Convention, and was later repealed.

As a partial substitute for that provision, the enactment of a transit tax on sugar shipped from one to another of the divisions of the monarchy (Austria, Hungary, or Bosnia-Herzegovina) was advocated by the ministers, and a bill for that purpose was introduced into the Austrian and into the Hungarian parliament, but up to the latest advices was not passed.<sup>a</sup> The rates were to be fixed at 29 cents per 100 pounds on raw sugar and 32 cents on refined (3.20 and 3.50 crowns per quintal), and were to be collected by the State from which shipped. The opposition of the Austrian producers and the demand of the Hungarians that the rates be raised have combined to prevent action thus far. The law was to be retroactive from September 1, 1903. Careful record has been kept of sugar shippers and, since August 1, 1904, of consignees as well, in order to collect back duties if the bill should pass. Anticipation of the tax especially at first curtailed shipments between the divisions of the monarchy.

#### THE CARTEL.

The Austro-Hungarian cartel antedated the German by about three years. It operated first during the sugar year 1897-98, and continued until the Brussels Convention went into effect.

The German and the Austro-Hungarian cartels followed the same methods to a remarkable extent. The Austro-Hungarian cartel, like the later German cartel, prohibited its members from dealings with raw sugar factories or refineries outside of the syndicate. Sales for exportation were left unrestricted. The normal price of raw sugar was fixed at \$2.76 per 100 pounds (15 florins per quintal), just 1 cent more than the German normal price. An allotment of sales was made to the refineries and of the cartel bonus to the raw sugar factories according to a fixed proportion that was invariable during the continuance of the cartel. The chief difference from the German cartel was that the actual price was determined monthly only from November to April, while for the period May to October but a single price was used, based on the average price for the preceding six months. The maximum bonus to be paid the raw-sugar factories was fixed at 73

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<sup>a</sup> Deutsche Zuckerindustrie, 1903, p. 1836; 1904, pp. 1379-1380.



cents per 100 pounds. Any fall in the actual price below \$2.03 per 100 pounds (11 florins per quintal) was disregarded in calculating the bonus.

After the Brussels Convention went into force it was not found practicable to overcome the difficulties involved in reorganizing the cartel or in effecting a new combination of the Austrian producers. The smaller number of producers in Hungary facilitated the formation of a selling pool embracing all the factories and refineries of that Kingdom.<sup>a</sup>

## PRICES.

Sugar prices in Austria-Hungary exhibit the same general features as in Germany. The domestic prices of sugar have remained high, while the export prices have fallen.

The first year of the cartel was 1897-98. For 1895-96 the average price of refined sugar at Prague was 6 cents per pound, and for 1896-97, 6½ cents. The price rose the following year to 6¾ cents per pound. During 1899-1900 the price was carried to 7¾ cents, at which point it was held until September 1, 1903. With no change whatever in the consumption tax, the price for the following year (September 1, 1903, to August 31, 1904), averaged less than 6¼ cents, showing a decline of 1½ cents after the Brussels Convention went into effect. On the other hand, the export price of sugar ranged considerably above the average price for the preceding year. (See Table 15.)

TABLE 15.—Average price of sugar in Austria, 1891-1904.

Year ending July 31—	At Prague.				At Trieste, first centrifugal, for exportation.	
	Raw, 88 per cent.		Refined. <sup>b</sup>		Per quintal.	Per pound.
	Per quintal.	Per pound.	Per quintal.	Per pound.		
	<i>Florins.</i>	<i>Cents.</i>	<i>Florins.</i>	<i>Cents.</i>	<i>Florins.</i>	<i>Cents.</i>
1891.....	15.67	2.96	(c)	(c)	16.82	3.18
1892.....	16.70	3.09	(c)	(c)	18.52	3.43
1893.....	19.01	3.50	(c)	(c)	21.00	3.87
1894.....	16.78	3.09	(c)	(c)	19.00	3.50
1895.....	13.08	2.41	(c)	(c)	14.65	2.70
1896.....	14.14	2.60	32.69	6.02	15.36	2.83
1897.....	11.91	2.19	34.05	6.27	13.25	2.44
1898.....	12.38	2.28	36.33	6.69	13.83	2.55
1899.....	13.15	2.42	36.13	6.65	13.90	2.56
	<i>Crowns.</i>		<i>Crowns.</i>		<i>Crowns.</i>	
1900.....	26.32	2.42	84.38	7.77	27.84	2.56
1901.....	29.32	2.70	84.25	7.76	27.43	2.53
1902.....	18.67	1.72	84.25	7.76	21.85	2.01
1903 <sup>d</sup> .....	20.88	1.92	84.47	7.78	22.47	2.07
1904 <sup>e</sup> .....	20.37	1.88	67.37	6.20	26.52	2.44

<sup>a</sup> Deutsche Zuckerindustrie, 1903, p. 1607.

<sup>b</sup> Prior to 1898-99, from the Journal des fabricants de sucre, December 17, 1902.

<sup>c</sup> No data available.

<sup>d</sup> Thirteen months ending August 31.

<sup>e</sup> Year ending August 31.

## ACREAGE AND PRODUCTION OF BEETS.

During the last twenty years the average area devoted to sugar beets in Austria-Hungary increased from 630,000 acres in 1882 to about 850,000 acres in 1901. During the same period the production of beets increased still more rapidly. In the earlier year 5,800,000 short tons of beets were harvested in Austria-Hungary, while in 1901 the crop amounted to over 9,300,000 short tons. The beet area and the crop for 1902 fell considerably below the corresponding figures for 1901, but increased again in 1903.

The average yield varied between 7 short tons per acre in 1887 and 11.44 short tons per acre in 1899. In 1902 the average yield was 10.30 short tons per acre, and in 1903 over 11 tons. There was a general increase during the period under consideration, but the average yield obtained by the beet growers of Austria-Hungary was decidedly inferior to that in Germany. Table 16<sup>a</sup> shows the acreage and the beet crop of Austria-Hungary for the calendar years, 1882-1903.

TABLE 16.—*Acreage and production of sugar beets in Austria-Hungary, 1882-1903.*

Year.	Austria-Hungary.			Austria.		Hungary.	
	Area.	Production.	Average yield per acre.	Area.	Production.	Area.	Production.
	<i>Acres.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Acres.</i>	<i>Short tons.</i>	<i>Acres.</i>	<i>Short tons.</i>
1882.....	629,611	5,834,309	9.27	549,019	5,090,899	80,592	743,410
1883.....	(a)	5,439,735	(a)	(a)	4,626,327	88,998	813,408
1884.....	693,642	5,998,682	8.65	597,542	5,253,437	96,100	745,245
1885.....	447,943	3,457,884	7.72	367,606	2,796,907	80,337	660,977
1886.....	541,577	4,329,866	7.99	445,099	3,635,922	96,478	693,944
1887.....	466,066	3,262,654	7.00	380,581	2,707,044	85,425	555,610
1888.....	585,031	5,315,758	9.09	479,937	4,419,600	105,094	896,158
1889.....	694,190	6,771,120	9.75	557,077	5,539,168	137,113	1,231,952
1890.....	770,087	7,182,042	9.33	605,051	6,087,882	165,036	1,094,160
1891.....	792,487	7,390,612	9.33	621,696	5,935,345	170,791	1,455,267
1892.....	813,938	7,562,546	9.29	631,741	6,080,019	182,197	1,482,527
1893.....	871,294	7,142,514	8.20	664,106	5,427,055	207,188	1,715,459
1894.....	935,730	9,032,233	9.65	707,578	7,413,519	228,152	1,618,714
1895.....	696,990	6,055,367	8.69	510,472	4,662,273	186,518	1,393,094
1896.....	799,087	8,214,665	10.28	611,588	6,541,899	187,549	1,672,766
1897.....	699,861	7,000,432	10.00	521,692	5,423,963	178,169	1,576,469
1898.....	703,343	6,856,176	9.75	517,981	5,201,265	183,362	1,654,911
1899.....	785,358	8,984,640	11.44	601,422	7,196,269	183,936	1,788,371
1900.....	818,831	7,951,865	9.71	592,566	5,763,036	226,265	2,188,829
1901.....	850,583	9,347,202	10.99	624,180	7,216,134	226,403	2,131,068
1902.....	711,784	7,329,995	10.30	483,429	5,165,598	228,355	2,164,397
1903.....	b 763,800	b 8,570,900	11.22	510,788	5,868,094	(a)	(a)

<sup>a</sup> Not stated.

<sup>b</sup> Beet area and beets worked in factories as estimated by the International Association for Sugar Statistics. See Deutsche Zuckerindustrie, 1903, p. 2011; 1904, statistical part, p. 844.

The increase in the beet acreage of Hungary was much more marked than that of Austria. In Hungary only 81,000 acres were devoted to beets in 1882, while 228,000 acres were planted in 1902. The crop meanwhile rose from 743,000 short tons of beets to over 2,000,000 short tons.

<sup>a</sup> Statistics for Austria are taken from the Statistisches Jahrbuch des K. K. Ackerbau-Ministeriums; for Hungary from the Ungarisches statistisches Jahrbuch.

In Austria the beet area increased only from 549,000 acres in 1882 to 624,000 acres in 1901 and in 1902 fell to 483,000 acres, considerably less than was devoted to beets twenty years earlier. In 1903 510,788 acres were planted in beets and 5,868,094 short tons harvested, an average of 11.49 tons per acre.

The average yield per acre for Hungary was materially below that for Austria.<sup>a</sup> The largest average yield obtained in Hungary was 9.72 short tons per acre in 1899. During the same year the Austrian beet growers obtained an average of 11.96 short tons per acre.

#### SUGAR PRODUCTION.

The output of the sugar industry in Austria-Hungary increased from 1,085,000,000 pounds during the campaign 1882-83 to 2,312,000,000 pounds in 1902-3 and 2,545,000,000 pounds in 1903-4. In 1901-2 a maximum production of 2,840,000,000 pounds was reached. The tax on sugar factories prior to August 1, 1888, was levied according to capacity, not according to output. For that period no official statistics of production are available and resort must be had to commercial estimates.

The proportion of refined sugar increased largely since 1888-89. In that year 25 per cent of the total output was unrefined, while in 1901-2 all but 9 per cent was refined and in 1902-3 the entire output was refined.

The increase of 135 per cent in sugar production during the twenty years from 1882-83 to 1902-3 was accomplished with an actual decrease in the number of factories. In the former year 232 factories were in operation; in the latter only 231. In 1882-83 each factory used on the average 23,000 short tons of beets and produced 4,700,000 pounds of sugar. Twenty years later the average quantity of beets used in one factory was 34,000 short tons and the average quantity of sugar produced over 10,000,000 pounds.

The average extraction of sugar from beets largely increased during the last twenty years. In 1882-83 the average amount of sugar obtained was 10.08 per cent of the weight of the beets used. In 1888-89 official statistics show an average extraction of 10.73 per cent. The extraction was increased to 14.40 per cent in 1901-2, 14.71 per cent in 1902-3, and 14.85 per cent in 1903-4. (See Table 17<sup>b</sup>.) The results obtained were in most years inferior to those in Germany.

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<sup>a</sup> See Table 2.

<sup>b</sup> Tables 17 and 18 are compiled from *Primes sucrières*, pp. 429, 431, supplemented by data from *Österreichisches statistisches Handbuch*, *Ungarisches statistisches Jahrbuch*, *Jahr- und Adressenbuch der Zuckerfabriken und -Raffinerien Österreich-Ungarns*, *Journal des fabricants de sucre*, January 13, 1904, *Deutsches Handels-Archiv*, 1903, I, pp. 315, 726, *Deutsche Zuckerindustrie*, 1903, pp. 1907-1910, 2011, 1904, statistical part, p. 521.

TABLE 17.—*Production of sugar in Austria-Hungary, 1883-1904.*

Year ending July 31—	Fac- tories.	Beets used. <sup>a</sup>	Sugar. <sup>b</sup>			Average extraction.	
			Total. <sup>c</sup>	Raw.	Refined.	Per ton of beets.	Per cent of beets.
	No.	Short tons.	Pounds.	Pounds.	Pounds.	Pounds.	Per cent.
1883.....	232	5,382,289	1,085,000,000	(d)	(d)	202	10.08
1884.....	230	4,612,649	1,086,000,000	(d)	(d)	225	11.23
1885.....	229	6,173,000	1,440,000,000	(d)	(d)	233	11.66
1886.....	212	3,472,000	816,000,000	(d)	(d)	235	11.75
1887.....	217	5,126,000	1,213,000,000	(d)	(d)	237	11.83
1888.....	203	3,582,000	882,000,000	(d)	(d)	246	12.31
1889.....	226	5,354,411	1,148,960,400	286,624,700	776,102,100	215	10.73
1890.....	228	6,975,639	1,630,218,300	358,606,700	1,144,450,700	234	11.69
1891.....	226	7,414,428	1,688,732,600	459,221,700	1,106,613,800	228	11.39
1892.....	226	7,415,872	1,706,792,500	517,579,700	1,070,291,600	230	11.51
1893.....	225	7,869,035	1,746,463,200	342,613,600	1,263,464,600	222	11.10
1894.....	227	7,343,804	1,832,837,900	220,505,700	1,451,099,000	250	12.48
1895.....	230	9,649,357	2,278,103,400	466,873,300	1,630,108,200	236	11.80
1896.....	232	6,419,499	1,715,625,900	134,721,600	1,422,813,800	267	13.36
1897.....	230	8,661,162	2,042,986,300	349,325,500	1,524,294,600	236	11.79
1898.....	228	7,576,211	1,805,041,600	e 48,948,800	1,668,591,200	238	11.91
1899.....	228	8,631,316	2,290,417,400	208,866,900	1,873,395,500	265	13.27
1900.....	227	9,392,480	2,414,688,900	322,648,100	1,882,836,900	257	12.85
1901.....	227	8,351,618	2,382,454,600	220,055,000	1,946,159,800	285	14.26
1902.....	231	9,860,000	2,839,856,100	260,559,300	2,321,367,300	288	14.40
1903 <sup>f</sup> .....	231	7,860,000	2,311,700,600	e 15,708,000	2,099,330,000	294	14.71
1904 <sup>g</sup> .....	(d)	8,570,900	2,545,411,000	(d)	(d)	297	14.85

<sup>a</sup> Statistics for 1882-83 and 1883-84 represent the quantity of beets taxed, officially estimated according to the capacity of the factories in operation; for 1884-85 to 1887-88, the actual quantity used as commercially estimated, and for subsequent years the actual quantity as officially returned.

<sup>b</sup> Prior to 1888-89, estimated. The statistics given are exclusive of Bosnia and Herzegovina, where 6,660,200 pounds were produced in 1901-2, and 5,191,000 pounds in 1902-3.

<sup>c</sup> In terms of raw sugar, refined sugar being reduced at the rate of 90 pounds to 100 pounds of raw.

<sup>d</sup> No data available.

<sup>e</sup> Excess of sugar melted for refining above the raw sugar produced during the factory year.

<sup>f</sup> Thirteen months ending August 31, 1903.

<sup>g</sup> Preliminary data for the year ending August 31, 1904.

For Austria and Hungary separately statistics of production are not available before August 1, 1888. Official statistics for earlier years show, in addition to the number of factories in operation, only the quantity of beets worked, as estimated for purposes of taxation. Nonofficial estimates of the quantity of beets worked in Austria-Hungary for the years 1882-83 to 1887-88, shown in Table 17, are considerably larger than the official quantities taxed, which are shown for Austria and Hungary separately in Table 18.

Austria still furnishes the bulk of the sugar produced in the Dual Monarchy, notwithstanding the rapid increase in the Hungarian output. In 1888-89 Austria alone produced 1,056,000,000 pounds of sugar, over 90 per cent of the aggregate production of the Dual Monarchy. In 1901-2 the production of Austria, while twice as large as in the earlier year, constituted only 80 per cent of the combined production of the Dual Monarchy, and in 1902-3, 72 per cent. During the fourteen years from 1888-89 to 1902-3 the sugar output of Hungary increased from 93,000,000 to 642,000,000 pounds. The average extraction in Austria since 1888-89 was uniformly higher than in Hungary, although generally below that in Germany.



TABLE 18.—*Production of sugar in Austria and Hungary separately, 1883–1903.*

Year ending July 31.	Austria.			Hungary.		
	Factories.	Beets used. <sup>a</sup>	Sugar produced. <sup>b</sup>	Factories.	Beets used. <sup>a</sup>	Sugar produced. <sup>b</sup>
	Number.	Short tons.	Pounds.	Number.	Short tons.	Pounds.
1883 .....	217	5,100,127	(c)	15	282,162	(c)
1884 .....	215	4,325,276	(c)	15	287,373	(c)
1885 .....	214	4,523,827	(c)	15	260,365	(c)
1886 .....	198	2,691,754	(c)	14	190,872	(c)
1887 .....	203	4,453,671	(c)	14	271,986	(c)
1888 .....	192	3,353,849	(c)	11	203,030	(c)
1889 .....	213	4,931,472	1,056,125,100	13	422,939	92,835,300
1890 .....	211	6,301,138	1,502,285,400	17	674,501	127,932,900
1891 .....	209	6,638,573	1,527,557,200	17	775,855	161,235,400
1892 .....	209	6,480,464	1,519,306,900	17	935,408	187,485,600
1893 .....	208	6,918,525	1,553,312,900	17	950,510	193,150,300
1894 .....	210	6,250,772	1,593,045,100	17	1,093,032	239,792,800
1895 .....	210	8,461,433	2,037,469,500	20	1,187,924	240,633,900
1896 .....	211	5,174,373	1,413,585,100	21	1,245,126	302,040,800
1897 .....	210	7,145,095	1,734,090,300	20	1,516,067	308,896,000
1898 .....	208	6,149,285	1,474,272,500	20	1,426,926	330,769,100
1899 .....	208	6,840,934	1,852,615,800	20	1,790,382	437,801,600
1900 .....	207	7,540,587	1,962,172,500	20	1,851,893	452,516,400
1901 .....	207	6,367,841	1,859,721,200	20	1,983,777	522,733,400
1902 .....	209	7,543,000	2,277,766,000	22	2,317,000	562,090,100
1903 <i>d</i> .....	209	5,559,200	1,669,273,100	22	2,300,800	642,427,500

<sup>a</sup> Prior to August 1, 1888, the statistics represent the quantity of beets taxed and are materially over than the actual quantity used, as estimated in Table 17.

<sup>b</sup> In terms of raw sugar, refined sugar being reduced at the rate of 90 pounds to 100 pounds of raw.

<sup>c</sup> No official returns of sugar production prior to August 1, 1888.

<sup>d</sup> Thirteen months ending August 31.

## FOREIGN TRADE IN SUGAR.

The imports of sugar into Austria-Hungary are inconsiderable. Austria-Hungary is essentially a sugar-exporting country. In 1882–83, as shown in Table 19,<sup>a</sup> 627,000,000 pounds of sugar were sold to foreign countries. This amount increased to 1,800,000,000 pounds in 1901–2 and nearly 1,900,000,000 pounds in 1902–3, but fell in 1903–4 to less than 1,400,000,000 pounds. During 1882–83 the exports constituted 58 per cent of the entire production of Austria-Hungary, in 1901–2, 63 per cent, and in 1902–3, 80 per cent. For the last-named year the proportion is exaggerated by the unusually small sugar output. In 1903–4, the first year under the Brussels Convention, little more than half of the sugar produced was exported.

During the period covered by the table the composition of the sugar exports changed radically. At the beginning of the period more raw than refined sugar was exported. The exports of refined sugar increased so rapidly as compared with raw sugar that in 1901–2 all but 5 per cent of the exports was refined. The two following years a somewhat larger proportion of raw sugar was exported—13 per cent in 1902–3 and 9 per cent in 1903–4.

<sup>a</sup> Prior to 1900–1901, compiled from *Primes sucrières*; for later years, from *Statistische Uebersichten betreffend den auswärtigen Handel des österr.-ungar. Zollgebiets*.

TABLE 19.—*Sugar imports and exports of Austria-Hungary, 1883-1904.*

Year ending July 31—	Imports.			Exports.			Percent- age of to- tal pro- duction exported.
	Total, <sup>a</sup>	Raw.	Refined.	Total, <sup>a</sup>	Raw.	Refined.	
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Per cent.</i>
1883.....	137,100	44,800	83,100	627,491,300	307,923,800	287,610,800	57.83
1884.....	110,700	18,500	82,900	560,400,700	245,945,200	283,010,000	54.09
1885.....	90,600	22,700	61,100	802,870,300	479,490,400	291,042,000	55.75
1886.....	90,600	25,800	58,400	443,963,500	152,096,000	262,680,700	54.41
1887.....	78,900	22,900	50,500	647,308,700	224,924,300	380,146,000	53.36
1888.....	75,800	12,300	57,100	421,181,300	111,830,500	278,415,600	47.75
1889.....	62,400	12,300	45,000	640,505,100	272,234,800	331,443,300	55.75
1890.....	87,500	11,000	68,800	909,324,700	307,568,600	541,580,500	55.78
1891.....	69,400	15,200	48,700	1,048,194,900	474,799,200	516,056,100	62.07
1892.....	57,100	6,200	45,900	1,030,756,500	472,928,800	502,045,000	60.39
1893.....	60,600	6,000	49,200	1,061,125,300	362,654,700	628,623,600	60.76
1894.....	95,200	16,500	70,800	1,080,433,500	198,216,900	793,994,800	58.95
1895.....	59,700	3,700	50,500	998,212,000	136,894,900	775,185,400	43.82
1896.....	104,700	16,500	79,400	1,113,171,800	365,497,100	672,907,200	64.88
1897.....	44,500	.....	40,100	1,245,786,200	223,735,800	919,845,300	60.98
1898.....	154,500	65,000	80,500	1,087,871,100	54,964,400	929,616,100	60.27
1899.....	206,400	101,000	94,800	1,585,148,000	309,241,400	1,148,316,000	69.21
1900.....	223,300	96,100	114,400	1,559,556,700	295,561,000	1,137,596,100	64.59
1901.....	170,200	60,000	99,200	1,557,320,200	203,342,200	1,218,580,300	65.37
1902.....	1,125,900	908,500	195,500	1,789,383,400	80,614,100	1,537,892,400	63.01
1903 <sup>b</sup> .....	1,159,400	614,400	490,500	1,857,339,800	236,116,800	1,459,100,600	80.35
1904 <sup>c</sup> .....	343,700	63,900	251,800	1,364,404,700	126,613,000	1,114,012,400	53.60

<sup>a</sup> Expressed in terms of raw sugar.<sup>b</sup> Thirteen months ending August 31.<sup>c</sup> Year ending August 31.

## RUSSIA.

The progress of the Russian industry during the last ten years has been remarkable. During the 1892-93 campaign Russia was surpassed in sugar production by Germany, Austria-Hungary, and France. In 1902-3 it stood second only to Germany, the output having increased during the ten years more than 150 per cent. In 1903-4 Russia retained second place, but by an exceedingly small margin.

Russia was not a party to the Brussels Convention.

### AREA DEVOTED TO SUGAR BEETS.

Owing to the enormous extent of Russian territory the area devoted to sugar beets is relatively small. In 1901 less than one-half of 1 per cent of the arable land of European Russia was planted in beets. The area of arable land for that year was 328,389,437 acres, of which 1,453,788 acres were devoted to beets.<sup>a</sup> The total area of arable land is not estimated annually.

### LOCALIZATION OF THE CROP.

The principal beet district of Russia is situated in the southwest. In the Governments of Kief and Podolia over 5 per cent of the total arable land was devoted to the crop. The city of Kief may be considered the industrial capital of the Russian sugar industry, in the same way as Magdeburg is the capital of the German industry, and

<sup>a</sup> Statistika Rossijskoj Imperii, LIII, Urozhaï, 1901, Part III; Messenger of Finance (Viestnik finansov), 1901, No. 32, pp. 238-240.

Prague of the Austrian. In Kharkof and Kursk, east of Kief, nearly 2 per cent of the arable land was planted in beets.

A second important beet district is located in Poland, about 2 per cent of the arable land in the Governments of Warsaw, Lublin, and Plock being devoted to beets.

#### LEGISLATION.

Like other important sugar-producing countries in Europe, Russia formerly levied its excise on beets instead of sugar, and in that way afforded an indirect incentive to increased sugar extraction. That tax was repealed, to take effect August 1, 1881.<sup>a</sup> For some time prior to July 1, 1886, exports to Europe received bounties,<sup>b</sup> which were repaid by a supplementary tax on the entire sugar industry. For the five years ending April 30, 1891, an export bounty of 80 kopecks per pood<sup>c</sup> was paid on exports to Persia and Central Asia, for which the Government was not reimbursed by the sugar industry. Since 1891 Russia claims to have bestowed no direct or indirect sugar bounty.

The internal market is restricted to domestic sugar by means of a high import duty. The present rates are \$6.42 per 100 pounds on raw sugar and \$8.56 per 100 pounds on refined sugar (4.50 and 6 rubles, respectively, per pood).

The internal tax since July 31, 1881, has been levied according to the actual quantity of sugar produced. The rate of tax was fixed at first at 50 kopecks per pood, and was gradually increased until on September 1, 1894, it amounted to 1.75 rubles per pood, the rate now in force,<sup>d</sup> equivalent to \$2.50 per 100 pounds since the gold standard went into effect.

<sup>a</sup> The dates used in reference to Russia are "old style;" 12 (after February 28, 1900, 13) days must be added to ascertain the corresponding dates of the Gregorian calendar.

<sup>b</sup> First at the rate of 1 ruble, and later at the rate of 80 kopecks per pood.

<sup>c</sup> The pood is equal to 36.112 pounds. The gold ruble (= 100 kopecks), which was made the standard monetary unit in 1897, is equal to 51.5 cents. Previously a gold coin, also called the ruble, valued at 77.2 cents, was the nominal standard, but a depreciated paper currency was actually in circulation. The average value of the paper ruble was as follows: 1883, 47.8 cents; 1884, 49 cents; 1885, 48.8 cents; 1886, 47.1 cents; 1887, 43.2 cents; 1888, 45.1 cents; 1889, 51.1 cents; 1890, 56.1 cents; 1891, 53.5 cents; 1892, 48.8 cents; 1893, 50.7 cents; 1894, 52.4 cents; 1895, 52.3 cents; 1896, 51.7 cents. The rates just given for the calendar years 1894, 1895, and 1896 were applied in converting the average prices for the sugar years 1893-94, 1894-95, and 1895-96, respectively, shown in Table 21.

<sup>d</sup> The rate of 50 kopecks per pood was in force from August 1, 1881, to July 31, 1883. The rate from August 1, 1883, to July 31, 1886, was fixed at 65 kopecks per pood; from August 1, 1886, to July 31, 1889, at 85 kopecks per pood, and from August 1, 1889, to August 31, 1894, at 1 ruble per pood. From September 1, 1892, to August 31, 1894, an additional tax of 40 kopecks per pood was imposed on refined sugar. See *Industries of Russia* (prepared for the Chicago Exposition of 1893 by the Russian Ministry of Finance), Vol. II, pp. 287-288.

In addition to the excise, a special license tax of about 7 cents per 1,000 pounds (5 rubles per 1,000 poods) has been levied on refining since August 31, 1892. On exportation the taxes actually collected are refunded.

Prior to 1895 various attempts were made on the part of persons interested in the beet-sugar industry to overcome by means of private combination the difficulties resulting from production in excess of the internal demand. In that year, by the law<sup>a</sup> of November 20, the Government modified the sugar legislation in such a way as to prevent the fall of the domestic price below what was considered a remunerative level. The means adopted to bring this about were exceedingly novel and effective.

In order to insure prices sufficiently high to offset the relatively high cost of production in Russia, an official limit was placed on the quantity of sugar that might be sold on the domestic market after payment of the regular tax of \$2.50 per 100 pounds. A so-called fixed reserve, also officially determined in amount, was required to be held by each factory. Sugar from this reserve was to be granted admission to the domestic market whenever actual prices for a period of two weeks exceeded a maximum price fixed periodically by the Government. All sugar entered for consumption other than as provided for was made liable to a double excise (\$4.99 per 100 pounds). The latter rate proved prohibitory. During the sugar year 1900-1901 only 11,000 pounds were entered in that way. At the beginning of the sugar year the amount of "free sugar" (sugar admitted to the domestic market) was frequently fixed lower than the anticipated demand, and was increased from time to time as required by trade conditions.

The apportionment of sugar among the various factories was determined as follows: The probable consumption of sugar within the Empire was officially determined at the beginning of each campaign. Each factory, without regard to its total production, was permitted to sell on the domestic market 60,000 poods (2,166,720 pounds). The remainder of the consumption was then apportioned among the various factories according to the amount of their production above 60,000 poods. The amount of sugar thus allowed to enter into domestic consumption was stated, not as an absolute quantity, but as a percentage of the total output above 60,000 poods. The fixed reserve was also apportioned among the factories in the form of a percentage of the output above 60,000 pounds. The remainder of the production, called the free reserve, could be entered for domestic consumption only after paying the double excise, but was available for exportation or, like the fixed reserve, might be carried forward to the production of the following year. For the sugar years 1897-98 to 1901-2 the amount

<sup>a</sup> See Bulletin de statistique, Vol. 39, pp. 149-150; Messenger of Finance, 1895, supplement to No. 53; 1903, No. 22, p. 372.



of free reserve sugar that might be counted in the next year's output was limited to 8 per cent of the total production of the factory.

The actual working of the law will be made clearer by considering the results of the sugar year 1902-3. The total official production<sup>a</sup> of the 278 factories in operation was 71,882,299 poods (about 2,596,000,000 pounds). Under the provisions of the law permitting 60,000 poods from each factory to be placed on the domestic market, 16,582,683 poods were actually entered, some of the factories not producing their full quota. The domestic requirement during the sugar year was fixed by the Government at 43,000,000 poods. In addition to the amount already provided for, 26,417,317 poods (= 43,000,000—16,582,683) were required for domestic consumption, representing about 47.78 per cent of the production above the 60,000-pood limit.<sup>b</sup> This amount was distributed among the various factories according to the production of each above 60,000 poods. Thus, each factory was permitted to sell on the domestic market 60,000 poods plus 47.78 per cent of its remaining output. (See Table 20.<sup>c</sup>) The fixed reserve for the campaign was placed at 5,000,000 poods, or 9.04 per cent of the output of each factory above 60,000 poods. Over 43 per cent of the output above 60,000 poods consequently remained for exportation. Of the total production in 1902-3, 1,553,000,000 pounds might be entered at the regular excise rate; 181,000,000 pounds constituted the fixed reserve; and 862,000,000 pounds, the so-called free reserve, were available for sale abroad. Of the last quantity 439,000,000 pounds, as shown by the customs statistics, were actually exported and the balance, together with the fixed reserve, was carried forward to the official production for 1903-4.

TABLE 20.—*Official production,\* consumption, and price of sugar in Russia, 1896-1904.*

Year ending August 31—	Official production. <i>a</i>		Admitted to domestic market (free sugar).		Rate. <i>d</i>	Maximum official price per pood.	
						Sept. 1— Dec. 31.	Jan. 1— Aug. 31.
	<i>Poods.</i>	<i>Pounds.</i>	<i>Poods.</i>	<i>Pounds.</i>	<i>Per cent.</i>	<i>Cents.</i>	<i>Cents.</i>
1896.....	42,465,554	1,533,516,100	25,500,000	920,856,000	40.90	6.88	7.16
1897.....	44,409,082	1,603,700,800	30,000,000	1,083,360,000	57.30	6.66	7.98
1898.....	46,135,169	1,666,033,200	33,000,000	1,191,696,000	59.00	6.56	6.85
1899.....	45,450,618	1,641,312,700	35,500,000	1,281,976,000	67.90	6.42	6.70
1900.....	53,369,187	1,927,268,100	36,500,000	1,318,088,000	57.75	6.35	6.56
1901.....	54,614,700	1,972,246,000	40,500,000	1,462,536,000	63.14	6.27	6.49
1902.....	63,295,358	2,285,722,000	46,000,000	1,661,152,000	63.07	6.20	6.42
1903.....	71,882,299	2,595,813,600	43,000,000	1,552,816,000	47.78	6.13	6.35
1904.....	81,071,265	2,927,645,500	45,000,000	1,625,040,000	56.26	5.99	6.20

<sup>a</sup> Including reserves carried over from the preceding year.

<sup>b</sup>  $(43,000,000 - 16,582,683) \div (71,882,299 - 16,582,683) = 26,417,317 \div 55,299,616 = 47.771$  per cent.

<sup>c</sup> Compiled from Messenger of Finance, 1904, No. 5, p. 186; Ukazatel Pravitel'stvennykh Rasporyazhenii (supplement to Messenger of Finance), 1903, No. 22, p. 282; 1904, No. 25, p. 437.

<sup>d</sup> The percentages shown in this column are determined for each year from the official production and the free sugar, each decreased by the total amount of the minimum output (80,000 poods for each factory in 1903-4, and 60,000 poods each in preceding years). These percentages are used for calculating from the total output of each factory the quantity that it may enter for domestic consumption in addition to 60,000 (or, in 1903-4, 80,000) poods.

Under the law of 1895 the sugar production of Russia largely increased. Profitable prices were obtained owing to the limitation of the domestic supply. Enlarged output increased the share of the producer in the highly profitable sales on the domestic market, but left a surplus available for sale only outside of the Empire. Exported sugar received no direct bounty, but carried with it the privilege of larger domestic sales. It was not necessary for every factory to export that portion of its surplus production which could not be entered on the home market. The exporter of free sugar—sugar that might be entered for domestic consumption by payment of the excise of \$2.50 per 100 pounds—received a certificate showing the amount of such sugar exported. That certificate permitted the holder to liquidate at the regular excise rate an equal quantity of sugar otherwise liable to the double rate. The certificate was negotiable, and brought a price approximately equal to the difference between the domestic price of sugar (less the excise) and the price of sugar destined for exportation. During the 1902–3 campaign the average price of raw sugar at Kief, destined for domestic consumption, was 6.17 cents per pound, or, without the excise, 3.67 cents per pound. For the same year the average export price of raw sugar at Kief was 1.53 cents per pound. The difference between these two prices (2.14 cents per pound) represents the greater profit obtained from domestic than from foreign sales, and was just equal to the average value of the export certificate during the same campaign (1.50 rubles per pood). Factories situated near the frontier export the bulk of their sugar and receive their profit by selling export certificates to factories situated nearer the centers of consumption. By this means a considerable saving in freight charges is effected.

The sugar legislation of Russia was considerably modified on September 1, 1903.<sup>a</sup> The main features of the law of 1895 were retained, but certain new provisions were added with the apparent object of preventing too rapid an increase in sugar production. In addition to the maximum price, the quantity admitted to the home market (free sugar), and the fixed reserve, the Government now determines also the useful production for all factories and the so-called productivity of each factory. The official productivity of a factory that has been in operation for eight or more of the preceding ten sugar years<sup>b</sup> is the average of its three largest outputs during that period. For factories in operation for a shorter time special regulations are in force. The productivity of new or enlarged factories is fixed at their estimated capacity, but must not exceed 160,000 poods. To each factory, how-

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<sup>a</sup> See Ukazatel, 1903, No. 23, pp. 295–296.

<sup>b</sup> Exclusive of the sugar years 1893–94 and 1894–95. Hence, in determining the productivity for 1903–4, a period of only eight years was taken, and for 1904–5 only nine years.

ever, is reserved the right to produce for domestic consumption a minimum of 80,000 poods (2,888,960 pounds). Production in excess of the allotment will have no direct effect either in increasing the quantity of sugar that may be entered for domestic consumption, or in increasing the allotment for any later year.

For 1903-4 the official productivity of the various factories amounted to 71,517,781 poods, while the total useful production was fixed at only 63,000,000 poods. Reserving to each factory its minimum output of 80,000 poods, it was necessary to reduce the remainder of its productivity to 82.80 per cent of the amount originally assigned, in order to make the sum of the allotments to the various factories equal the determined amount of the useful production. Had all factories produced their full quota the free sugar would have been obtained by decreasing pro rata the useful production of each factory. But some of the factories produced in the aggregate 1,900,207 poods less than their allotments, while the others produced 19,971,472 poods above their share in the total useful production. The allotments of the factories that exceeded their useful production were consequently increased 9.52 per cent of the excess to allow for the underproduction of other factories; or, what is the same thing, the supranormal excess—90.48 per cent of the actual excess above the useful production for each factory—was deducted from the actual production. The amount so obtained was divided like the actual production in prior years into free sugar, fixed reserve, and free reserve.

The actual production in 1903-4, including the quantity carried over from the preceding year, was 81,071,265 poods (about 2,928,000,000 pounds). Decreased to 63,000,000 poods by subtracting the supranormal excess (90.48 per cent of 19,971,472 poods), decreased again 21,852,071 poods (the total of the 80,000 poods reserved to each factory, some factories not producing that full amount), the remainder—41,147,929 poods—was divided into free sugar, fixed reserve, and free reserve in the proportions<sup>a</sup> of 56.26 per cent, 14.58 per cent, and 29.16 per cent, respectively. The 80,000 poods for each factory was added to the free sugar and the supranormal excess to the free reserve. The amount entered for domestic consumption was 1,625,000,000 pounds, the fixed reserve was 217,000,000 pounds, and the remainder, which can not be utilized in the domestic market during the current year, was 1,086,000,000 pounds.

While the calculations involved by the sugar law are extremely complicated, its essential principles are much simpler. Certain amounts are officially determined only in total (the domestic consumption, the

<sup>a</sup> See Table 20.  $(45,000,000 - 21,852,071) \div (63,000,000 - 21,852,071) = 56.26$  per cent.  $6,000,000 \div (63,000,000 - 21,852,071) = 14.58$  per cent. The proportion indicated for free sugar is in addition to the 21,852,071 poods, and that for free reserve is in addition to 18,071,265 poods (the excess of the actual over the useful production).

fixed reserve, and the useful production) and are subsequently apportioned among the various factories according to percentages from the operations of the entire sugar industry. The useful production for a given factory is calculated from its official productivity; the supranormal excess from its actual production above its useful production; that excess and 80,000 poods are deducted from its total output and the balance divided into free sugar, fixed reserve, and free reserve. In order to share to the fullest extent in domestic sugar sales, the factory must bring its total output up to the productivity allotted to it. Production beyond that point has no effect unless some factories fail to produce the full quantity assigned to them. In such a case the amount of their deficiency is divided among the factories that have exceeded their allotment. The changes in the law take away much of the former incentive to continually increasing production above the domestic requirements.

#### PRICES.

Since the beginning of the sugar year 1895-96 the domestic sugar prices have been limited to a figure fixed by the Government. This limit at first was fixed at about 7 cents per pound. It was lowered slightly each year until for the 1903-4 campaign it was a little over 6 cents per pound. (See Table 20.) The actual prices have been on the average but slightly below the official limit.

Attention has already been called to the marked difference between export and domestic prices. During the sugar year 1902-3 the average difference between the price of granulated sugar for domestic consumption at Kief and the price of sugar for exportation at Odessa was 4.35 cents per pound. The excise of 2.50 cents per pound, which is included in the former price, explains part of the difference; the balance, 1.85 cents, represents the net advantage to the producer for the home market over the producer for shipment abroad. Loaf sugar sold for 7.69 cents per pound at Kief in 1902-3. (See Table 21.) Statistics for eleven months of 1903-4 show a further decline in the domestic price of granulated sugar and an increase in the export price.

High domestic prices naturally resulted in an extremely low per capita consumption of sugar. In 1902-3, as shown in Table 20, the quantity of sugar admitted to the domestic market was 1,553,000,000 pounds. Estimating the total population of Russia, exclusive of Finland, at 138,000,000 persons in that year, the average consumption of sugar per capita was about 11 pounds. For 1900-1901 the per capita consumption is officially estimated at 10.5 pounds, for 1895-96, 7.9 pounds, and for 1891-92, 6.9 pounds.



TABLE 21.—Average price of sugar in Russia, 1894–1904.

Year ending August 31—	Granulated sugar, per pound.				Loaf sugar, per pound.	
	At Kief.		At Odessa.		At Kief.	At Mos-cow.
	For domestic consumption.	For export.	For domestic consumption.	For export.		
	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>
1894.....	6.01	3.26	6.25	1.77	8.42	8.49
1895.....	6.52	2.11	6.63	2.20	8.20	8.20
1896.....	6.48	2.10	6.86	2.59	8.09	8.20
1897.....	6.60	1.85	7.04	2.25	8.36	8.46
1898.....	6.63	1.90	6.97	2.28	8.24	8.26
1899.....	6.47	2.08	6.80	2.67	8.27	8.23
1900.....	6.33	1.94	6.65	2.30	8.19	8.36
1901.....	6.42	1.95	6.67	2.32	8.00	8.31
1902.....	6.36	1.54	6.49	1.85	7.86	8.07
1903.....	6.18	1.53	6.42	1.83	7.69	7.70
1904 <sup>a</sup> .....	6.06	1.73	6.35	2.00	7.77	7.77

<sup>a</sup> Average for the eleven months ending July 31, 1904.

## ACREAGE AND SUGAR PRODUCTION.

The area devoted to sugar beets has more than doubled since 1882, when only 633,000 acres were planted in beets. In 1903 beets were planted on 1,361,000 acres. This increase has occurred in spite of the remarkably low tonnage obtained in Russia. In 1903 the yield was only  $6\frac{1}{4}$  tons per acre and in 1900 only  $5\frac{1}{2}$  tons.

On the manufacturing side the Russian sugar industry is by no means backward. The average extraction, while usually lower than in Germany and Austria, is generally higher than in France and Hungary. The average yield has increased considerably since 1882–83. In that year the average extraction was  $8\frac{1}{2}$  per cent; in 1902–3 it reached 13 per cent, and in 1903–4, according to preliminary returns, nearly  $15\frac{1}{2}$  per cent, a rate above that obtained in any other country of Europe. During the twenty years the total production increased to nearly four times its former amount, reaching 2,619,000,000 pounds in 1903–4. (See Table 22.<sup>a</sup>)

<sup>a</sup> Compiled from Industries of Russia, Vol. II, pp. 288–289; Messenger of Finance, 1901, No. 47, p. 366; 1902, No. 46, p. 276; 1903, No. 29, p. 116, No. 42, p. 86, and No. 46, p. 288; 1904, No. 5, p. 186, No. 19, p. 260, and No. 21, p. 357; Ukazatel, 1904, No. 25, p. 437; Réglement définitif du Budget de l'Empire; and Deutsche Zuckerindustrie, 1904, p. 1125.

TABLE 22.—*Area of sugar beets, production of sugar, and amount of excise in Russia, 1883-1904.*

Year ending August 31—	Factories.	Area. <i>a</i>	Beets used.		Sugar produced.		Average extraction.		Excise. <i>c</i>
			Quantity.	Average per acre.	In terms of refined.	In terms of raw. <i>b</i>	Per short ton of beets.	Per cent of beets.	
	<i>No.</i>	<i>Acres.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Lbs.</i>		<i>Dollars.</i>
1883.....	237	632,888	4,134,317	6.53	633,328,300	703,698,100	170	8.51	4,246,461
1884.....	244	745,471	3,999,223	5.86	677,451,700	752,724,100	188	9.41	6,073,925
1885.....	245	787,583	4,447,416	5.65	756,839,600	840,932,900	189	9.45	6,764,945
1886.....	241	808,760	6,079,451	7.52	1,048,677,800	1,165,197,600	192	9.58	7,098,741
1887.....	229	731,254	5,188,326	7.10	987,093,100	1,041,214,600	201	10.03	10,005,865
1888.....	218	623,803	4,706,914	7.55	857,624,900	952,916,600	202	10.12	7,699,744
1889.....	220	663,511	5,064,135	7.63	1,025,339,800	1,139,266,400	225	11.25	9,176,807
1890.....	220	668,556	4,821,584	7.21	924,697,300	1,027,441,400	213	10.65	12,134,040
1891.....	223	753,756	5,452,735	7.23	1,028,304,700	1,142,560,800	210	10.48	11,158,731
1892.....	227	759,696	4,740,713	6.24	1,070,714,700	1,189,683,000	251	12.55	13,518,886
1893.....	224	713,366	4,024,053	5.64	880,709,900	978,566,600	243	12.16	15,382,550
1894.....	226	825,644	6,225,299	7.54	1,275,315,900	1,417,017,700	228	11.38	21,603,614
1895.....	227	829,356	5,993,788	7.23	1,184,567,700	1,316,186,300	220	10.98	24,951,156
1896.....	231	865,856	6,060,750	7.00	1,405,980,500	1,562,200,600	258	12.89	22,060,274
1897.....	236	874,786	6,317,944	7.22	1,383,126,200	1,536,806,900	243	12.16	28,570,370
1898.....	239	992,834	6,568,075	6.62	1,416,537,600	1,573,930,700	240	11.98	30,159,316
1899.....	244	1,085,441	6,640,651	6.12	1,479,627,500	1,644,030,600	248	12.38	34,774,262
1900.....	268	1,197,209	8,055,352	6.73	1,742,408,000	1,936,008,900	240	12.02	32,597,324
1901.....	275	1,309,975	7,169,228	5.47	1,762,460,400	1,958,289,300	273	13.66	36,953,381
1902.....	278	1,323,212	9,109,421	6.88	2,128,573,000	2,365,081,100	260	12.98	41,857,761
1903.....	278	1,486,444	9,699,227	6.53	2,281,652,000	2,535,168,900	261	13.07	438,904,000
1904.....	275	1,361,383	8,491,014	6.24	2,357,027,500	2,618,919,400	308	15.42	( <i>e</i> )

*a* For 1902-3 and 1903-4, comprising the area planted in 1902 and 1903, respectively; for the preceding years apparently the area from which the beets used by factories were harvested. In 1904 (for the 1904-5 factory year) 1,163,911 acres were planted.

*b* Reduced on the assumption that 100 pounds of raw sugar make 90 pounds of refined.

*c* For the calendar year.

*d* Preliminary statistics, subject to correction.

*e* Calendar year (1904) not ended.

#### FOREIGN TRADE IN SUGAR.

By 1888 the Russian sugar industry was able in most years to supply fully the domestic market. The imports since that time were consequently generally small. In 1893, however, over 60,000,000 pounds of raw sugar were purchased abroad and sold by the Russian Government in order to prevent the rise of prices above a limit fixed by the Government.<sup>a</sup>

The exports of sugar have at times been large. They represent, however, the surplus of production over profitable sale in the domestic market and not an increased production for the purpose of shipment abroad. Their amount consequently fluctuated largely from year to year. The bulk of the exports in recent years was destined for Persia and Finland. Turkey has also become an important market for Russian sugar, 32,572,121 pounds having been declared for that country in 1902. On the other hand, the shipments to the United Kingdom and Italy, which as late as 1896 constituted the bulk of the sugar exports of Russia, have since become insignificant. (See Table 23.)

<sup>a</sup> See Ukazatel, 1892, No. 46, p. 495.

TABLE 23.—*Sugar imports and exports of Russia and import duty collected, 1888–1903.*

Calendar year.	Imports.	Exports.				Import duty.
		Total.	To Finland.	To Persia.	To other countries.	
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Dollars.</i>
1888.....	150,900	201,534,500	2,577,700	2,561,200	196,395,600	1,180
1889.....	164,600	179,520,000	1,023,100	36,952,500	141,544,400	1,314
1890.....	1,275,600	118,196,000	1,273,300	2,991,900	113,930,800	49,446
1891.....	311,500	273,658,800	1,174,500	46,738,800	225,745,500	9,263
1892.....	268,500	106,994,100	696,100	31,691,500	74,606,500	9,246
1893.....	61,094,200	82,355,400	977,900	39,523,800	41,853,700	1,466,585
1894.....	338,000	190,139,100	1,192,700	55,116,300	133,830,100	7,881
1895.....	384,000	205,351,100	1,382,000	63,578,000	140,391,100	6,854
1896.....	722,500	491,211,200	5,538,700	69,677,400	415,995,100	13,322
1897.....	1,227,600	294,193,700	43,859,900	85,080,600	165,253,200	13,765
1898.....	1,370,300	263,396,400	55,643,500	77,549,800	130,203,100	17,973
1899.....	1,216,900	280,133,900	65,841,600	90,516,500	123,775,800	13,905
1900.....	696,000	452,486,300	92,049,700	109,765,800	250,670,800	11,820
1901.....	336,700	282,746,500	73,242,300	104,526,700	104,977,500	9,476
1902.....	499,500	288,604,500	94,899,100	133,061,200	60,644,200	6,720
1903 <sup>a</sup> .....	720,000	540,050,000	219,740,000	<sup>b</sup> 142,340,000	177,970,000	( <sup>c</sup> )

<sup>a</sup> Subject to revision.<sup>b</sup> Data from Deutsche Zuckerindustrie, 1904, p. 568.<sup>c</sup> No data available.

## FRANCE.

France was for many years the principal beet-producing country of Europe. The growth of its industry, however, failed to keep pace with that in other European countries, and France is now surpassed in sugar output by Germany, Russia, and Austria-Hungary.

## AREA DEVOTED to SUGAR BEETS.

Little more than 1 per cent of the arable land of France is devoted to the cultivation of sugar beets.<sup>a</sup> According to the agricultural census of 1892, the arable land of France amounted to 64,000,000 acres. No similar data are available for later years. For the five years 1898–1902 the land planted in beets amounted on an average to 723,000 acres.

## LOCALIZATION OF THE CROP.

In France beet culture is exceedingly concentrated. Three-fourths of the entire crop is raised in five departments in the northern part of France, comprising in all less than one-tenth of the cultivated area of the country. This beet section lies to the north of Paris and extends to the English Channel and to the Belgian frontier. About 13 per cent of the entire arable land of the Department of Aisne is occupied in beet culture, 12 per cent of Nord, and 8 per cent of Somme, Oise, and Pas de Calais.

<sup>a</sup> Statistique agricole de la France \* \* \* résultats généraux de l'enquête décennale, 1892, and Statistique agricole annuelle, 1898–1902.

## LEGISLATION.

Prior to 1864 the sugar legislation of France granted indirect bounties on production, by permitting the liquidation of the sugar tax according to the quantity and density of beet juice. By means of a legal rate of drawback that overestimated the quantity of raw sugar required to produce a given quantity of refined sugar, refiners obtained an indirect bounty on exportation down to 1875. From that date to August 31, 1884, the French industry received no bounty, direct or indirect.

When the law of July 29, 1884, was enacted the French beet factories were poorly equipped and the rate of extraction as compared with Germany was exceedingly low. In order to withstand the competition of Germany it seemed necessary to encourage by law the adoption of improved methods, and a tax system was adopted similar in effect to the German and Austrian beet tax. The consumption tax on sugar was nominally retained, but the amount of sugar subject to the tax was determined by the quantity of beets worked. From 100 quintals of beets, during the sugar years 1884-85 to 1886-87, it was assumed that 6 quintals of refined sugar would be produced,<sup>a</sup> and only that quantity of sugar was taxed. All additional sugar produced was free of taxation. The legal ratio of refined sugar to beets was raised to 6.25 per cent for 1887-88, to 6.50 per cent for 1888-89, to 6.75 per cent for 1889-90, to 7 per cent for 1890-91, and to 7.75 per cent for subsequent sugar years.

At the time the law was enacted the average extraction was but little, if any, above the legal standard. An increase in the average quantity of sugar obtained appeared almost immediately. During the sugar year 1885-86 the average extraction, in terms of refined sugar, was 7.83 per cent of the quantity of beets worked; during 1889-90 it reached 10.48 per cent, or more than twice the average extraction in 1882-83.

By requiring part of the domestic product and all imported sugar to pay the full tax rate domestic prices were kept at a high level. Producers who obtained a surplus yield were benefited by the amount of excise remitted. This naturally proved a powerful incentive to the adoption of improved methods and to the observance of all possible economies. By the law of May 27, 1887, the rate of the consumption tax was increased from \$4.38 to \$5.25 per 100 pounds (from 50 to 60 francs per quintal) of refined sugar produced up to the legal yield, and sugar obtained above that point was subject to a tax of 88 cents per 100 pounds (10 francs per quintal). The tax on sugar produced above the legal yield was doubled by the law of July 24, 1888, and again raised by the law of August 5, 1890, to \$2.63 per 100 pounds (30 francs per quintal).

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<sup>a</sup>This applied only to factories using the diffusion process. Prior to September 1, 1887, for factories using mechanical pressure the legal yield was fixed at 5 quintals.



Beginning with the sugar year 1891-92, the full tax of \$5.25 was applied to all sugar produced up to 7.75 per cent of the quantity of the beets worked; the half rate of \$2.63 to the next 2.75 per cent; while one half of the sugar produced in excess of 10.50 per cent was made dutiable at \$5.25 and the other half at \$2.63. Hence, of the refined sugar obtained from each short ton of beets worked, 155 pounds were dutiable at the full rate of \$5.25 per 100 pounds, 55 pounds at \$2.63, and the remainder at \$3.94.<sup>a</sup>

In addition to the consumption tax, foreign beet sugar was liable to a surtax of 79 cents per 100 pounds (9 francs per quintal) on raw sugar not above 98 per cent, and \$1.40 per 100 pounds (16 francs per quintal<sup>b</sup>) on raw sugar of a higher test and on refined sugar. This surtax was collected on the actual weight and not on the equivalent in terms of refined sugar.

The law of April 7, 1897, increased the benefit obtained by sugar producers by providing direct export bounties of 31 to 39 cents per 100 pounds, abatements of taxes on colonial sugar varying from 20 to 22 cents per 100 pounds, and a rebate of 18 cents per 100 pounds on domestic sugar for exportation produced at certain places where freight rates to the seaboard were unusually high. To compensate for these bounties and rebates, a new tax of 9 cents per 100 pounds (1 franc per quintal) on raw sugar for direct consumption and 35 cents per 100 pounds (4 francs per quintal) on refined sugar was imposed. It was provided that in case the export bounties and rebates exceeded the amount of these new taxes, the rate of bounty should be reduced. The full bounties were paid only during 1897-98, as shown in Table 24. For 1902-3 the bounties were fixed at 10 to 13 cents per 100 pounds, less than one-third of the full rates.

TABLE 24.—*Direct export bounties on sugar granted by France, 1897-1903.*

[Cents per 100 pounds in terms of refined sugar.]

Year ending Aug. 31—	Raw sugar. <sup>a</sup>	Refined sugar. <sup>b</sup>		Year ending Aug. 31—	Raw sugar. <sup>a</sup>	Refined sugar. <sup>b</sup>	
		Candy.	Other.			Candy.	Other.
1897.....	20	26	23	1901.....	19	25	22
1898.....	31	39	35	1902.....	14	18	16
1899.....	21	27	24	1903.....	10	13	11
1900.....	24	31	28				

<sup>a</sup>Not less than 65° and not more than 98° for domestic beet sugar or 97° for French colonial sugar.

<sup>b</sup>Including raw sugar above 98° for beet or 97° for colonial sugar.

For the sugar year 1902-3 the average domestic price of refined sugar at Paris was \$8.18 per 100 pounds (93.42 francs per quintal). The

<sup>a</sup> A fixed percentage of colonial sugar might be entered at half rate, the percentage being determined by the proportion of domestic sugar produced above the legal yield of 7.75 per cent during the preceding campaign. (See Table 28.)

<sup>b</sup> The rate for imports from countries enjoying the conventional tariff rates was 88 cents per 100 pounds (10 francs per quintal).

average export price of French refined sugar (Say's cubes), free on board, was \$2.49 per 100 pounds. The domestic price consequently exceeded the export price by \$5.69 per 100 pounds, but little less than the full consumption tax, refining tax, and bounty (\$5.71 per 100 pounds). While domestic prices were thus raised, the treasury receipts were not correspondingly increased. The refining tax merely furnished the means to pay the export bounty, while the average consumption tax actually collected during the calendar year 1902 was only \$3.30 per 100 pounds.

During the calendar year 1902 the total sugar entered for consumption in France,<sup>a</sup> as shown by Table 25,<sup>b</sup> amounted to 1,005,000,000 pounds. Of this quantity only 262,000,000 pounds, or 26 per cent of the whole, paid the full tax. The quantity entered at the reduced rate of \$2.63 per 100 pounds, representing the surplus yield, amounted to 720,000,000 pounds, or 72 per cent. Twenty-three million pounds for use in wine making were entered at the still lower rate of \$2.10 per 100 pounds (2½ francs per quintal).

TABLE 25.—*Sugar entered for consumption in France<sup>a</sup> and taxes collected, 1883-1903.*

Calendar year.	Entered for consumption.				Taxes collected. <sup>b</sup>			
	Total.	At full tax rate.	At reduced tax rate.	For use in wine making.	Total.	At full tax rate.	At reduced tax rate.	For use in wine making.
	<i>Pounds. c</i>	<i>Pounds. c</i>	<i>Pounds. c</i>	<i>Pounds. c</i>	<i>Dollars.</i>	<i>Dollars.</i>	<i>Dollars.</i>	<i>Dollars.</i>
1883.....	886,648,279	886,648,279			31,048,375	31,048,375		
1884.....	856,754,910	833,529,498	23,225,412		32,630,381	32,630,381		
1885.....	852,745,519	733,747,296	101,948,225	17,049,298	32,673,005	32,374,491		298,514
1886.....	865,345,485	561,754,556	243,485,034	60,105,895	25,641,587	24,589,201		1,052,386
1887.....	891,213,346	420,200,728	391,722,310	79,290,308	23,608,910	20,654,729	1,288,589	1,665,592
1888.....	867,640,156	476,290,556	303,760,286	87,589,314	29,792,629	25,016,214	2,936,110	1,840,305
1889.....	792,151,118	379,280,023	367,291,515	45,579,580	26,806,449	19,922,269	5,926,524	957,656
1890.....	934,101,875	430,490,401	426,971,822	76,639,652	31,920,625	22,612,179	7,698,194	1,610,252
1891.....	926,552,070	488,069,851	358,503,441	79,978,778	36,726,970	25,639,795	9,406,580	1,680,595
1892.....	933,514,671	539,620,403	326,943,977	66,950,291	38,338,160	28,344,636	8,586,858	1,406,666
1893.....	857,698,772	548,159,253	265,886,918	43,652,601	36,693,555	28,793,158	6,983,224	917,173
1894.....	884,655,041	533,778,195	303,788,788	47,088,058	37,012,241	28,043,816	7,979,022	989,403
1895.....	888,953,263	476,902,130	353,147,722	58,903,411	35,563,124	25,050,054	9,275,454	1,237,597
1896.....	904,700,712	491,688,893	340,114,094	72,897,725	36,290,883	25,826,721	8,932,536	1,531,626
1897.....	815,421,978	523,047,547	242,106,308	50,268,123	34,888,639	27,473,863	6,358,518	1,056,258
1898.....	802,109,499	511,381,851	206,690,143	84,037,505	34,059,560	26,865,269	5,428,424	1,765,867
1899.....	963,042,199	481,420,898	395,507,603	86,113,698	37,488,504	25,291,792	10,387,401	1,809,311
1900.....	999,284,390	324,371,976	638,265,695	36,646,719	34,573,804	17,040,888	16,762,943	769,973
1901.....	928,820,562	185,401,545	733,351,841	10,067,176	29,210,396	9,738,663	19,260,216	211,517
1902.....	1,004,772,722	261,800,362	720,033,116	22,939,304	33,144,113	13,751,688	18,910,473	482,002
1903.....	1,157,770,216	849,797,552	307,369,929	602,735	29,942,300	21,857,098	8,072,539	12,663

<sup>a</sup> Exclusive of sugar entered for consumption in Corsica.

<sup>b</sup> Exclusive of surtaxes, except in 1903.

<sup>c</sup> In terms of refined.

<sup>d</sup> Owing to an error in the original statistics, this figure is 19 more than the sum of figures in the next three columns.

The domestic sugar production subject to the reduced tax, as shown in Table 28, amounted to but 641,000,000 pounds, or 28 per cent of the total, in 1901-2, and 510,000,000 pounds, or 30 per cent of the total,

<sup>a</sup> Exclusive of Corsica. French sugar was entered for consumption in that island during 1902 to the amount of 4,160,891 pounds. Such sugar was taxed at half rate (\$2.63 per 100 pounds).

<sup>b</sup> Data for 1883-1900 from *Primes sucrières*; for 1901-1902 from *Tableau général du commerce*; for 1903 from *Journal officiel*, July 9, 1904.

in 1902-3. Yet, as has been said, 720,000,000 pounds, or 72 per cent of the total consumption, was actually entered at the reduced rate during the calendar year 1902. This apparent inconsistency is due to the exportation of the bulk of the sugar nominally liable to the full tax. Practically all of the sugar, both domestic and colonial, subject to the reduced tax was entered for consumption, and only 262,000,000 pounds of higher-taxed sugar was required. The remainder was exported with exemption from all taxation. For every 100 pounds of sugar nominally subject to the full tax exported in 1902-3 30 pounds might be entered for domestic consumption at the reduced tax rate.

From September 1, 1903, all bounties and tax exemptions, except the rebates granted by law of 1897, were abolished. The law of January 28, 1903, which brought French sugar legislation into conformity with the principles of the Brussels Convention, reduced the consumption tax to \$2.19 per 100 pounds (25 francs per quintal) of refined sugar, abolished the supplemental tax on raw sugar, and reduced the refining tax to 18 cents per 100 pounds (2 francs per quintal). The consumption tax was to be paid on the actual quantity of sugar admitted to the domestic market, with no reference whatever to the beets used. The former indirect bounty on production was thus abolished.

The foreign sugar imported into France was subjected to a surtax of 48 cents per 100 pounds (5.50 francs per quintal) on raw sugar not above 98 per cent and 53 cents per 100 pounds (6 francs per quintal) on raw sugar of a higher test and on refined sugar. These surtaxes, like those formerly in force, were to be collected according to the actual weight, and were in addition to the consumption tax, to which foreign, as well as domestic and colonial, sugar was subject.

#### PRICES.

Price quotations for France, as for other continental countries, disclose a wide difference between the domestic and the export price of refined sugar. (See Table 26.) The difference prior to September, 1903, was approximately equal to the consumption tax, the refining tax, and the direct export bounty. A marked decline in the domestic price resulted from the sugar law of 1903. The average price of refined sugar for the year ending August 31, 1904, was only 5.09 cents per pound, as compared with 8.18 cents per pound during the sugar year 1902-3. The nominal reduction in tax which brought about this decrease was 3.23 cents; but the reduction from the average tax receipts for 1902 was only about 1.25 cents per pound.

TABLE 26.—Average price of French sugar, 1891-1904.

Year ending August 31—	At Paris.				For exportation (Say's cubes f. o. b.).		
	Raw, 88 per cent.		Refined, good (bonne sorte).				
	Per quintal.	Per pound.	Per quintal.	Per pound.	Per cwt.	Per pound.	
	<i>Francs.</i>	<i>Cents.</i>	<i>Francs.</i>	<i>Cents.</i>	<i>s.</i>	<i>d.</i>	<i>Cents.</i>
1891.....	34.63	3.03	105.88	9.27	16	11	3.68
1892.....	37.44	3.28	104.75	9.17	18	3 $\frac{1}{2}$	3.97
1893.....	41.18	3.61	111.36	9.75	20	9 $\frac{1}{4}$	4.52
1894.....	33.83	2.96	107.58	9.42	18	4	3.98
1895.....	26.35	2.31	96.46	8.44	13	10 $\frac{1}{2}$	3.01
1896.....	29.75	2.60	101.07	8.85	15	4	3.33
1897.....	25.10	2.20	96.20	8.42	12	0	2.61
1898.....	29.45	2.58	100.84	8.83	12	9	2.77
1899.....	31.36	2.75	105.13	9.20	13	6 $\frac{3}{4}$	2.95
1900.....	30.09	2.63	104.08	9.11	13	9 $\frac{1}{2}$	2.99
1901.....	25.00	2.19	101.71	8.90	13	4 $\frac{3}{4}$	2.91
1902.....	17.99	1.57	95.49	8.36	10	10	2.35
1903.....	21.23	1.86	93.42	8.18	11	5 $\frac{1}{2}$	2.49
1904.....	23.08	2.02	58.11	5.09	12	10 $\frac{1}{2}$	2.80

## ACREAGE AND PRODUCTION OF BEETS.

The twenty years 1882-1901 witnessed a material increase in the beet acreage. In 1882, as shown in Table 27,<sup>a</sup> 587,000 acres were planted in beets and three years later only 478,000 acres. By 1901 the beet area had increased to 837,000 acres, but in 1902 fell to 624,000 acres and in 1903, according to commercial estimates, to 579,000 acres.

As in Germany, the tendency has been in the direction of increasing the sugar content of the beet at the expense of its weight. Thus, while in 1882, on the average, 15 $\frac{3}{4}$  short tons of beets were obtained per acre, the average yield in 1902 was 11 short tons and in 1903 12 $\frac{1}{4}$  short tons.

The beet crop of 1883 reached nearly 10,000,000 short tons, a figure higher than that for any subsequent year, although exceeding the 1901 crop by only 30,000 short tons. In 1902, 6,926,000 short tons of beets were produced and in 1903 about 7,100,000 short tons.

The average farm value of beets increased from \$3.53 per short ton in 1885 to \$4.87 in 1898. It fluctuated widely from year to year and in 1902 was \$3.79 per short ton. The total value of the beet crop was greatest in 1900, when it was estimated at nearly \$45,000,000. In that year the average return to the beet grower was \$55 per acre and in 1902 \$42. The factory price of beets has ranged from 37 cents to \$1.01 per ton above the farm price.

<sup>a</sup>Compiled from *Statistique agricole annuelle*, and *Bulletin de statistique et de législation comparée*.



TABLE 27.—*Area and production of sugar beets in France, 1882-1903.*

Year.	Area.	Production.		Yield per acre.	Average price per short ton.	
		Quantity.	Farm value.		Farm value.	Factory price.
	<i>Acres.</i>	<i>Short tons.</i>		<i>Short tons.</i>		
1882.....	587,001	9,228,850	(a)	15.72	(a)	\$3.68
1883.....	643,609	9,969,414	(a)	15.49	(a)	3.61
1884.....	577,913	7,805,088	(a)	13.51	(a)	3.33
1885.....	478,499	6,045,120	\$21,347,814	12.63	\$3.53	3.98
1886.....	527,158	7,596,331	27,271,069	14.41	3.59	4.20
1887.....	480,424	5,648,083	22,557,275	11.76	3.99	4.60
1888.....	497,612	6,016,505	23,506,328	12.09	3.91	4.82
1889.....	559,289	7,875,411	36,007,267	14.08	4.57	5.42
1890.....	590,359	7,139,130	28,013,587	12.09	3.92	4.34
1891.....	642,845	7,203,910	28,962,248	11.21	4.02	4.61
1892.....	626,819	6,747,790	29,215,489	10.77	4.33	4.72
1893.....	640,088	6,665,471	30,247,768	10.41	4.54	4.94
1894.....	662,796	8,421,773	33,573,829	12.71	3.99	4.55
1895.....	586,650	7,030,786	29,426,283	11.98	4.19	4.63
1896.....	667,276	9,352,612	30,273,467	14.02	3.24	4.25
1897.....	666,466	8,555,758	33,424,991	12.84	3.91	4.55
1898.....	648,022	7,268,065	35,384,087	11.22	4.87	5.29
1899.....	690,301	7,965,911	35,823,658	11.54	4.50	5.26
1900.....	814,481	9,464,514	44,873,804	11.62	4.74	5.20
1901.....	837,195	9,939,948	40,692,544	11.87	4.09	4.46
1902.....	624,155	6,926,116	26,282,929	11.10	3.79	4.03
1903 <sup>b</sup> .....	578,900	7,100,500	(a)	12.27	(a)	(a)

<sup>a</sup> No data available.

<sup>b</sup> Commercial estimates of area and beets worked from Deutsche Zuckerindustrie, 1903, p. 2011, 1904, statistical part, p. 254.

## SUGAR PRODUCTION.

The sugar production of France was more than doubled during the last twenty years. The output for 1901-2 was 2,446,000,000 pounds in terms of raw sugar, three times as large as the output in 1882-83, but in 1903-4 only 1,751,000,000 pounds were produced. In 1902-3 the average extraction was 13.14 per cent, and in 1903-4 12.33 per cent. (See Table 28.<sup>a</sup>)

The original data show the output in terms of refined sugar. They also include the molasses produced, estimated at 14 per cent of its actual weight. In order to make the returns comparable with those of other leading beet-sugar countries, the production has been calculated in terms of raw sugar exclusive of molasses. This has been done on the assumption that 90 pounds of refined sugar are equivalent to 100 pounds of raw sugar.

The beet pulp produced increased during the twenty years from 2,000,000 short tons in 1882-83 to 4,500,000 short tons in 1901-2. The average price per ton fell even more rapidly than the production increased; so that the aggregate value of the beet pulp in 1901-2 was less than in 1882-83. It may be of interest to observe that the value of the beet pulp during the sugar year 1901-2 was over \$3,000,000, or about 8 per cent of the entire value of the beet crop. In 1902-3 the value of the 3,100,000 tons of beet pulp produced was \$2,200,000.

<sup>a</sup> Compiled from official data published in Bulletin de statistique et de législation comparée; for 1903-4, preliminary data from Journal des fabricants de sucre, September 21, 1904.

TABLE 28.—*Production of sugar in France, 1883-1904.*

Year ending August 31—	Beets used.	Sugar produced, including molasses. <sup>a</sup>			Average extraction per cent of beets.	Equivalent in raw sugar, exclusive of molasses.		
		Total.	Subject to reduced tax.			Total.	Per ton of beets.	Per cent of beets.
	<i>Short tons.</i>	<i>Pounds.<sup>b</sup></i>	<i>Pounds.<sup>b</sup></i>	<i>Per ct.<sup>c</sup></i>	<i>Per ct.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Per ct.</i>
1883.....	7,948,987	799,691,236			5.03	803,161,000	101	5.05
1884.....	8,058,830	895,084,461			5.55	909,857,000	113	5.65
1885.....	5,022,956	601,772,803	87,400,344	14.52	5.99	602,436,000	120	6.00
1886.....	3,731,769	584,405,178	171,856,674	29.41	7.83	611,899,000	164	8.20
1887.....	5,398,050	956,892,459	347,843,315	36.35	8.86	1,031,383,000	191	9.55
1888.....	3,984,409	760,024,071	208,910,597	27.49	9.54	790,209,000	198	9.92
1889.....	4,654,977	909,449,178	239,580,106	26.34	9.77	954,226,000	205	10.25
1890.....	7,359,012	1,541,821,854	440,807,094	28.59	10.48	1,630,598,000	222	11.08
1891.....	7,164,847	1,356,362,784	263,159,195	19.40	9.47	1,414,446,000	197	9.87
1892.....	6,204,631	1,273,865,039	303,732,442	23.84	10.27	1,344,283,000	217	10.83
1893.....	6,032,769	1,153,812,836	224,659,135	19.47	9.56	1,210,872,000	201	10.04
1894.....	5,787,287	1,134,903,397	240,427,404	21.18	9.80	1,190,419,000	206	10.28
1895.....	7,867,927	1,553,039,526	337,589,408	21.74	9.87	1,640,585,000	209	10.43
1896.....	5,965,079	1,308,754,022	351,856,376	26.88	10.97	1,376,792,000	231	11.54
1897.....	7,457,060	1,473,876,445	318,532,555	21.61	9.88	1,548,831,000	208	10.38
1898.....	7,056,989	1,609,506,804	450,744,258	28.01	11.40	1,703,923,000	241	12.07
1899.....	6,730,219	1,626,779,078	476,693,714	29.30	12.09	1,723,671,000	256	12.81
1900.....	8,150,931	1,916,239,594	550,366,322	28.72	11.75	2,024,725,000	248	12.42
1901.....	9,609,233	2,293,432,474	664,590,707	28.98	11.93	2,425,261,000	252	12.62
1902.....	10,307,444	2,319,086,302	641,035,834	27.64	11.25	2,446,208,000	237	11.87
1903.....	6,908,055	1,711,118,291	509,727,246	29.79	12.38	1,815,812,000	263	13.14
1904.....	47,100,500	1,603,334,199			11.29	1,751,401,000	247	12.35

<sup>a</sup> At 14 per cent of actual weight.<sup>b</sup> In terms of refined sugar.<sup>c</sup> These percentages determined the proportion of colonial sugar imported during the following campaign that might be entered at reduced tax.<sup>d</sup> No longer officially ascertained; commercial estimate from Deutsche Zuckerindustrie, 1903, p. 2011.

## FOREIGN TRADE IN SUGAR.

France differs from other continental beet-sugar countries, with the exception of the Netherlands, in possessing important cane-sugar colonies. Importation of colonial sugar has been encouraged, such sugar being granted privileges practically equal to those enjoyed by the product of domestic beet factories. The imports of colonial sugar increased from 168,000,000 pounds in 1883 to 286,000,000 pounds in 1903.

It was not until 1889 that the sugar exports of France surpassed the imports. In that year 601,000,000 pounds of sugar were exported. The exports in 1901 reached a maximum of 1,461,000,000 pounds, but declined to 469,000,000 pounds in 1903. (See Table 29.)

TABLE 29.—*Sugar imports and exports of France, 1883–1903.*

Calendar years.	Imports.				Exports.		
	Total.	Raw.		Refined.	Total.	Raw.	Refined.
		Colonial.	Other.				
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
1883.....	453, 101, 339	167, 960, 125	281, 697, 386	3, 443, 828	373, 932, 934	110, 221, 350	263, 711, 584
1884.....	486, 195, 493	162, 986, 378	303, 445, 392	19, 763, 723	296, 597, 128	49, 646, 328	246, 950, 800
1885.....	610, 764, 436	241, 818, 961	360, 512, 948	8, 432, 527	163, 712, 360	11, 424, 600	152, 287, 760
1886.....	352, 375, 474	216, 080, 888	131, 433, 690	4, 860, 896	306, 182, 758	93, 703, 421	212, 479, 337
1887.....	348, 233, 406	262, 868, 111	80, 914, 644	4, 450, 651	350, 543, 432	20, 214, 242	330, 329, 190
1888.....	462, 126, 424	277, 679, 608	181, 110, 246	3, 336, 570	357, 050, 727	112, 942, 267	244, 108, 460
1889.....	354, 250, 369	243, 407, 139	106, 764, 848	4, 078, 382	601, 353, 001	304, 304, 689	297, 048, 312
1890.....	317, 420, 717	230, 750, 998	81, 661, 018	5, 008, 701	782, 317, 103	456, 711, 310	325, 605, 793
1891.....	340, 356, 464	213, 810, 485	121, 822, 289	4, 723, 690	630, 888, 024	373, 576, 363	257, 311, 661
1892.....	357, 829, 519	222, 701, 609	131, 993, 783	3, 134, 127	498, 286, 833	231, 560, 293	266, 726, 540
1893.....	316, 529, 465	245, 665, 172	69, 679, 524	1, 184, 769	596, 082, 300	352, 912, 784	243, 169, 516
1894.....	375, 466, 231	244, 287, 573	130, 047, 041	1, 131, 617	655, 534, 964	372, 277, 528	283, 257, 436
1895.....	305, 565, 568	210, 372, 707	92, 810, 590	2, 382, 271	478, 595, 769	220, 692, 993	257, 902, 776
1896.....	349, 628, 689	268, 072, 385	80, 827, 715	728, 589	522, 833, 624	287, 976, 071	234, 857, 553
1897.....	276, 188, 174	271, 994, 013	4, 007, 895	186, 266	1, 068, 432, 543	765, 414, 609	303, 017, 934
1898.....	219, 845, 550	212, 577, 100	7, 077, 514	190, 936	686, 233, 673	418, 392, 167	267, 841, 506
1899.....	234, 576, 897	229, 884, 784	4, 554, 841	137, 272	840, 547, 605	526, 012, 960	314, 534, 645
1900.....	209, 015, 583	205, 750, 488	3, 111, 053	154, 042	1, 294, 240, 912	901, 227, 357	393, 013, 555
1901.....	222, 413, 622	219, 029, 345	3, 251, 185	133, 092	1, 460, 943, 686	1, 059, 813, 753	401, 129, 933
1902.....	220, 185, 165	218, 022, 504	2, 021, 428	141, 233	804, 985, 289	465, 208, 853	339, 776, 436
1903.....	288, 071, 008	285, 657, 002	2, 104, 158	309, 848	469, 125, 132	155, 283, 719	313, 841, 413

## BELGIUM.

## AREA DEVOTED TO SUGAR BEETS.

More than 3 per cent of the entire arable land of Belgium is devoted to beet culture. During the three years, 1900–1902, sugar beets occupied on the average 142,000 acres. The total arable land was 4,231,000 acres.<sup>a</sup>

## LOCALIZATION OF THE CROP.

The Belgian beet area adjoins the French on the one hand and the Dutch on the other. The separation of the area into three parts is political, not physical. The beets produced in Belgium are exported in considerable quantities to France and there manufactured into sugar, while an approximately equal quantity of French beets are imported into Belgium. Belgian factories also receive large quantities of beets from the Netherlands.

The distribution of the crop is general throughout Belgium. During the years 1900–1902 only two provinces devoted less than 1 per cent of their total arable land to sugar beets. Beets occupied 9 per cent of the total arable land in Hainaut, adjacent to the French province Nord, and 6 per cent in Liege.

<sup>a</sup> Recensement agricole, 1900–1902.

## LEGISLATION.

Domestic beet sugar in Belgium, prior to September 1, 1903, was taxed, not according to the actual amount produced, but according to the presumed yield. This yield was estimated according to the quantity and density of beet juice used in sugar manufacture. By the law of 1865 it was estimated that for each hectoliter of juice and each degree of density at a temperature of 15° C. 1,500 grams of sugar would be obtained. By subsequent enactments the presumed yield of sugar was raised successively to 1,650, to 1,750, to 1,900, and, finally, to 2,000 grams. The sugar product thus estimated was subject to a tax of \$3.94 per 100 pounds (45 francs per quintal).

The import duty on loaf sugar and also the drawback on exportation were fixed at \$4.48 per 100 pounds (51.13 francs per quintal), and on other grades of sugar at corresponding rates. A surtax, fixed at 15 per cent in 1885 and at 10 per cent in 1895, was also imposed on foreign sugar.

It was further provided that the receipts for each year must amount to at least 6,000,000 francs. For 1898 this limit was temporarily reduced to 5,000,000 francs.

The Belgian system, like the former German and Austrian systems, imposed the tax according to the raw material used, while the drawback on exportation was determined by the amount of the finished product. It doubtless had the same effect in encouraging a larger sugar extraction. Moreover, owing to the extremely complicated method employed in assessing the tax, it most effectively concealed the bounty that it undoubtedly carried.

The adherence of Belgium to the Brussels Convention made necessary the abolition of presumed yield as the basis for imposing the domestic sugar tax. The tax on all sugar, domestic and imported, was fixed at \$1.73 per 100 pounds (20 francs per quintal), with a surtax on foreign sugar of 48 cents per 100 pounds (5.50 francs per quintal).

## ACREAGE AND PRODUCTION OF BEETS.

Unfortunately the annual agricultural statistics for Belgium prior to 1900 do not show the area devoted to the various crops nor the production, but give merely an estimate of the average yield obtained.<sup>a</sup>

A general agricultural census was taken by Belgium in 1880 and in 1895. Similar statistics for the leading crops are now collected annually. Hence the area devoted to sugar beets and the crop harvested, shown in Table 30, cover only the years 1880, 1895, and 1900-1903. There was an increase in acreage from 81,000 acres in 1880 to 157,000 acres in 1900, and in beets harvested from less than 1,300,000 short

<sup>a</sup>The average yield per acre, 1882-1899, shown in Table 2, was compiled from *Annuaire statistique de la Belgique*.



tons to 2,400,000 short tons. The largely decreased area in 1902, combined with a comparatively small yield, brought the total crop for that year down to 1,500,000 short tons.

TABLE 30.—*Acreage and production of sugar beets in Belgium, 1880, 1895, and 1900–1903.<sup>a</sup>*

Year.	Arca.	Production.	Average yield per acre.	Year.	Arca.	Production.	Average yield per acre.
	<i>Acres.</i>	<i>Short tons.</i>	<i>Shorttons.</i>		<i>Acres.</i>	<i>Short tons.</i>	<i>Shorttons.</i>
1880.....	80,621	<i>b</i> 1,259,845	15.63	1901.....	152,036	2,389,351	15.72
1895.....	133,681	<i>b</i> 1,731,486	12.95	1902.....	117,600	1,503,425	12.78
1900.....	156,946	2,403,309	15.31	1903.....	146,200	1,704,000	11.66

<sup>a</sup>Data from the Recensement général, 1880, 1895, and the Recensement agricole, 1900–1902; and for 1903 commercial estimates of area and beets worked, from Deutsche Zuckerindustrie, 1903, p. 2011, 1904, statistical part, p. 254.

<sup>b</sup>Calculated from the acreage and average yield. The production statistics given in the official reports for 1880 and 1895 are based on the average yield for the ten years ending 1880 and 1895, respectively, and hence do not represent the beet crop of the individual years named.

### SUGAR PRODUCTION.

Owing to the complicated manner of collecting the Belgian sugar tax, it is not possible to show accurately the sugar produced. No account whatever was officially taken of the actual output of factories or of refineries. Table 31<sup>a</sup> shows the number of factories and refineries in operation and gives official estimates of the raw and refined sugar produced.

TABLE 31.—*Sugar production, as officially estimated, and sugar imports and exports of Belgium, 1883–1903.*

Calendar year.	Facto-ries.	Raw sugar produced.	Imports.	Exports.
	<i>No.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
1883.....	155	211,248,374	52,681,673	232,138,910
1884.....	150	134,243,502	50,389,286	149,480,048
1885.....	107	156,106,860	37,154,113	156,458,121
1886.....	109	198,371,967	28,799,581	216,911,128
1887.....	111	231,917,608	31,621,512	245,965,368
1888.....	114	205,498,811	30,073,235	193,887,315
1889.....	116	398,583,402	27,172,626	360,173,672
1890.....	119	360,478,681	30,784,882	353,402,422
1891.....	120	330,787,311	28,944,606	293,899,708
1892.....	122	311,667,697	30,872,588	288,882,968
1893.....	121	419,561,687	26,016,370	459,082,670
1894.....	124	363,435,089	21,466,512	272,772,184
1895.....	123	480,827,508	22,878,061	379,720,752
1896.....	126	440,575,207	21,664,558	396,829,290
1897.....	123	480,863,485	23,004,134	520,758,833
1898.....	128	414,522,441	27,730,158	381,329,917
1899.....	123	539,513,581	27,739,499	519,731,135
1900.....	120	674,775,727	27,579,149	663,049,951
1901.....	121	602,499,761	35,496,443	514,230,708
1902.....	113	408,004,874	28,506,239	296,284,814
1903.....	113	<sup>a</sup> 429,460,946	27,999,679	257,178,129

<sup>a</sup>Including refined sugar produced in beet factories reduced to terms of raw sugar at the rate of 90 pounds of refined to 100 pounds of raw.

Official statistics do not disclose the quantity of beets worked. In order to ascertain approximately the results obtained in the Belgian sugar industry, recourse must consequently be had to commercial

<sup>a</sup>Compiled from Tableau général du commerce avec les pays étrangers.

estimates. According to the statistics in Table 32<sup>a</sup>, the average extraction during the last ten years has varied between 11 per cent in 1894-95 and 13.97 per cent in 1898-99. For 1902-3 the average yield was 13.88 per cent. The effect of the short beet crops of 1902 and 1903 is seen in the decreased sugar output from 716,500,000 pounds in 1901-2 to 440,900,000 pounds in 1902-3 and 439,200,000 pounds in 1903-4.

TABLE 32—*Production of sugar in Belgium, as commercially estimated, 1893-94 to 1903-4.*

Sugar year.	Beets used.	Sugar produced.	Average extraction.	
			Per ton of beets.	Per cent of beets.
	<i>Short tons.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Per cent.</i>
1893-94 .....	2,076,000	499,100,000	240	12.02
1894-95 .....	2,511,000	552,900,000	220	11.01
1895-96 .....	1,947,000	485,000,000	249	12.46
1896-97 .....	2,568,000	617,300,000	240	12.02
1897-98 .....	1,980,000	515,900,000	261	13.03
1898-99 .....	1,649,000	460,800,000	279	13.97
1899-1900 .....	2,179,000	595,200,000	273	13.66
1900-1901 .....	2,715,000	705,500,000	260	12.99
1901-2 .....	2,762,000	716,500,000	259	12.97
1902-3 .....	1,588,000	440,900,000	278	13.88
1903-4 .....	1,704,000	439,200,000	258	12.89

#### FOREIGN TRADE IN SUGAR.

The total sugar imports of Belgium decreased from 53,000,000 pounds in 1883 to 28,000,000 pounds in 1903. The sugar exports, on the other hand, rapidly increased, reaching a maximum of 663,000,000 pounds in 1900. Since that year there has been a successive decline in the exports to 514,000,000 pounds in 1901, 296,000,000 pounds in 1902, and 257,000,000 pounds in 1903. (See Table 31.)

#### NETHERLANDS.

##### AREA DEVOTED TO SUGAR BEETS.

The Netherlands devotes a larger proportion of its land to sugar-beet culture than any other country. During the five years 1896-1900 the entire arable land of the Netherlands averaged little more than 2,000,000 acres, while the area in sugar beets exceeded 100,000 acres—more than 5 per cent of the total arable land of the Kingdom.<sup>b</sup>

##### LOCALIZATION OF THE CROP.

Beets are raised generally throughout the Netherlands and are not confined to any one section. Zeeland, however, is the leading Province, 13 per cent of its arable land during the years 1896-1900 having

<sup>a</sup> Compiled from data collected by the International Association for Sugar Statistics. See *Deutsche Zuckerindustrie*, 1898, p. 1338; 1899, p. 1943; 1900, p. 1856; 1901, statistical part, p. 683; 1902, p. 1955; 1903, p. 2011.

<sup>b</sup> Jaarcijfers, 1897, and Verslag van den landbouw in Nederland, 1896-1900.

been planted in beets. Sugar beets occupied 11 per cent of the arable land in the adjoining Province of South Holland, 7 per cent in Friesland, and 6 per cent in North Holland and North Brabant.

## LEGISLATION.

Prior to 1897 the sugar legislation of the Netherlands was very similar to that of Belgium. The tax on the domestic product was determined by the quantity and density of beet juice employed in sugar manufacture, while the import duty and the drawback on exportation were imposed on the actual quantity of sugar crossing the frontier. The rate of the import duty and of the drawback on exportation, as well as the nominal tax on domestic sugar, was \$4.92 per 100 pounds (27 florins per quintal) for refined sugar other than candy and for raw sugar testing not less than 98° by the polariscope.

The results of the Dutch sugar legislation are somewhat more clear than the results of the Belgian law. The surplus production, which was exempt from taxation, was officially ascertained for the campaign of 1894-95, and for other years has been officially estimated. According to these estimates, no less than 20 per cent of the entire output of sugar during 1891-92 entirely escaped taxation, and 19 per cent during 1893-94.

Up to this time the presumed yield of sugar was 1,635 grams for each hectoliter of juice and each degree of density at 15° C. By the law of January 11, 1894,<sup>a</sup> the presumed yield was increased 12½ per cent, with the result that for the 1894-95 and the 1895-96 campaigns only 14 per cent of the total output was exempt from taxation. The law of 1894 also fixed a minimum limit of receipts from the excise. That limit for 1894-95 was placed at 8,500,000 florins and for 1895-96 at 8,650,000 florins.

In 1896 it was proposed again to increase the official estimate of yield<sup>b</sup> so as to bring the presumed yield closer to the results actually obtained by the factories. Instead of this, however, the law of January 29, 1897, was adopted,<sup>c</sup> which entirely abandoned the imposition of taxes according to the presumed yield. In place of the former indirect bounty a direct bounty was granted both to raw-sugar manufacturers and to refiners. On raw sugar the rate for the 1897-98 campaign was fixed at 46 cents per 100 pounds<sup>d</sup> (2.50 florins per quintal), while the total amount of bounties was limited to 2,500,000 florins. The bounty was to be gradually reduced until in 1905-6 the rate would be 24 cents per 100 pounds (1.30 florins per quintal) and the maximum limit 1,700,000 florins. The bounty on refining was

<sup>a</sup> Deutsches Handels-Archiv, 1894, Pt. I, p. 337.

<sup>b</sup> Ibid., 1897, Pt. I, p. 202.

<sup>c</sup> Ibid., 1897, Pt. I, pp. 419-427.

<sup>d</sup> In terms of refined sugar.

fixed at 6 cents per 100 pounds (0.34 florin per quintal) for 1897-98, the total amount of such bounties not to exceed 500,000 florins. The rate was to be gradually reduced to 3 cents per 100 pounds (0.19 florin per quintal) for 1902-3 and subsequent years, and the maximum amount to 250,000 florins.

The rates of bounty actually paid, owing to the maximum limit imposed, fell considerably below those stated in the law. The bounty paid on raw sugar per 100 pounds was as follows: For 1897-98, 41 cents; 1898-99, 33 cents; 1899-1900, 27 cents; 1900-1901, 25 cents. The bounty on refining per 100 pounds was: For 1897-98 and 1898-99, 5 cents; 1899-1900, 4 cents; 1900-1901, 3 cents.

The bounty was abolished after August 31, 1903, by law of July 24, 1903.<sup>a</sup> No change was made in the excise and no surtax was imposed on imported sugar.

#### ACREAGE AND PRODUCTION OF BEETS.

The area of sugar beets in the Netherlands increased from 45,000 acres in 1882 to 98,000 acres in 1903, and the crop from 462,000 to 1,058,000 short tons. The average yield fluctuated widely. The lowest yield was that for 1888, when only 7 tons per acre were harvested; the highest was for 1896, 17 tons per acre. (See Table 33.<sup>b</sup>)

TABLE 33.—*Acreage, production, and average price of sugar beets in the Netherlands, 1882-1903.*

Year.	Area.	Production.	Average yield per acre.	Average price of beets per short ton.
	<i>Acres.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Dollars.</i>
1882.....	45,276	461,692	10.20	4.01
1883.....	50,453	638,525	12.66	4.01
1884.....	52,887	655,625	12.40	3.92
1885.....	39,630	442,622	11.17	3.65
1886.....	45,054	481,708	9.58	3.83
1887.....	47,283	488,118	10.32	3.57
1888.....	54,177	383,090	7.07	3.87
1889.....	58,286	852,567	14.63	4.19
1890.....	69,435	807,117	11.62	4.12
1891.....	55,674	463,969	8.33	3.54
1892.....	60,742	826,416	13.61	4.00
1893.....	70,125	835,711	11.92	3.83
1894.....	82,618	813,262	9.84	3.67
1895.....	86,712	1,134,776	13.09	3.42
1896.....	112,606	1,920,758	17.06	3.65
1897.....	95,153	1,269,774	13.34	3.10
1898.....	106,572	1,386,178	13.01	3.65
1899.....	114,815	1,766,794	15.39	3.54
1900.....	114,884	1,663,500	14.48	3.32
1901.....	122,169	2,014,538	16.49	3.48
1902.....	82,067	1,007,886	12.28	3.25
1903.....	98,079	1,057,994	10.79	3.54

#### SUGAR PRODUCTION.

Prior to 1897-98 the sugar produced above the legal yield was exempt from taxation, and hence was not officially returned, except

<sup>a</sup> Deutsches Handels-Archiv, 1903, Pt. I, pp. 1194-1195.

<sup>b</sup> Jaarcijfers, and Verslag van den landbouw in Nederland.



for 1894-95. Estimates made by the Dutch Government for each year show that an increasing quantity of sugar thus escaped taxation.

The raw material on which the sugar tax was based was the beet juice, not the beets worked. The quantity of beets worked by the factories is consequently lacking in the official returns. In order to facilitate comparison between the sugar industry in the Netherlands and in other countries, the quantity of beets used, as estimated by the International Association for Sugar Statistics, has been inserted in Table 34.

TABLE 34.—*Beets used and sugar produced in the Netherlands, 1885-1904.*

Year ending August 31—	Facto- ries. <sup>a</sup>	Beets used. <sup>b</sup>	Sugar produced.				Average raw sugar extraction.	
			Subject to tax. <sup>c</sup>	Surplus (free of tax). <sup>c</sup>	Total.		Per short ton of beets.	Per cent of beets.
					In terms of refined sugar. <sup>e</sup>	In terms of raw sugar. <sup>d</sup>		
	No.	Short tons.	Pounds. <sup>e</sup>	Pounds. <sup>e</sup>	Pounds.	Pounds.	Pounds.	Per ct.
1885.....	30	(f)	71,193,564	6,448,455	77,642,019	86,268,910	(f)	(f)
1886.....	27	(f)	41,631,439	6,286,417	47,917,856	53,242,062	(f)	(f)
1887.....	30	(f)	63,259,511	11,450,031	74,709,542	83,010,602	(f)	(f)
1888.....	30	(f)	66,284,112	11,533,365	77,817,477	86,463,863	(f)	(f)
1889.....	30	(f)	60,803,547	12,039,100	72,842,647	80,936,274	(f)	(f)
1890.....	30	(f)	102,537,507	23,070,918	125,608,425	139,564,917	(f)	(f)
1891.....	30	(f)	112,630,867	25,454,532	138,085,399	153,428,220	(f)	(f)
1892.....	30	(f)	68,880,657	17,357,918	86,238,575	95,820,640	(f)	(f)
1893.....	30	(f)	100,044,217	24,142,574	124,186,791	137,985,323	(f)	(f)
1894.....	30	687,000	110,216,874	26,271,336	136,488,210	151,653,568	221	11.04
1895.....	30	765,000	135,217,695	21,512,207	156,729,902	174,144,335	228	11.38
1896.....	30	902,000	170,610,702	28,190,033	198,800,735	220,889,705	245	12.24
1897.....	30	1,407,000	278,572,723	37,571,516	316,144,239	351,271,376	250	12.48
1898.....	31	1,011,000	246,862,726	.....	246,862,726	277,025,627	274	13.70
1899.....	31	1,237,000	295,805,397	.....	295,805,397	330,167,510	267	13.35
1900.....	31	1,378,000	337,324,457	.....	337,324,457	377,052,738	274	13.68
1901.....	32	1,350,000	353,815,967	.....	353,815,967	392,575,327	291	14.54
1902.....	32	1,639,000	394,163,000	.....	394,163,000	447,913,000	273	13.66
1903.....	28	785,000	210,535,000	.....	210,535,000	225,777,500	288	14.38
1904.....	29	1,032,000	(f)	.....	(f)	272,378,000	264	13.20

<sup>a</sup> Prior to 1903-4 from the Jaarcijfers; for 1903-4 from the Deutsche Zuckerindustrie (estimates of the International Association for Sugar Statistics).

<sup>b</sup> According to the estimates of the International Association for Sugar Statistics.

<sup>c</sup> Prior to 1901-2 from *Primes sucrières*, p. 581. For 1901-2 and 1902-3 from the Jaarcijfers, 1902. The surplus for 1894-95 was officially ascertained; for the other years, officially estimated.

<sup>d</sup> Since 1896-97 official figures, reprinted in *Deutsche Zuckerindustrie*, statistical part, 1899, p. 514; 1900, p. 664; 1903, p. 499; 1904, p. 494. For earlier years reduced from the preceding column at the rate of 90 pounds of refined sugar to 100 pounds of raw.

<sup>e</sup> In terms of refined sugar.

<sup>f</sup> No data available.

#### FOREIGN TRADE IN SUGAR.

Sugar refining in the Netherlands considerably antedated the raw-sugar industry. The refineries at first obtained their raw sugar chiefly from Java. But, unlike France, the Netherlands made no decided effort to retain control of the sugar product of its colonies, and the demands of the United Kingdom and, more recently, those of the United States drew away from the Netherlands the bulk of the sugar output of Java.

Foreign beet sugar, subject to no higher duty, took the place of colonial sugar. It was not until after 1895 that the output of domestic beet factories surpassed the receipts from abroad. After that year the imports fell off, but increased again in 1902, owing to the short beet crop of that year. The exports in 1896 and subsequent years considerably exceeded the imports. (See Table 35.)

TABLE 35.—*Sugar imports and exports of the Netherlands, 1883–1903.*

Calendar year.	Imports.	Exports.	Calendar year.	Imports.	Exports.
	<i>Pounds.</i>	<i>Pounds.</i>		<i>Pounds.</i>	<i>Pounds.</i>
1883.....	261, 181, 311	207, 676, 141	1894.....	259, 219, 426	247, 301, 314
1884.....	281, 415, 949	236, 528, 024	1895.....	244, 256, 611	266, 210, 295
1885.....	254, 951, 435	198, 906, 414	1896.....	185, 083, 094	293, 065, 123
1886.....	206, 600, 350	182, 274, 399	1897.....	164, 564, 854	307, 129, 566
1887.....	233, 342, 779	212, 650, 535	1898.....	154, 111, 334	310, 193, 710
1888.....	232, 305, 173	205, 751, 694	1899.....	123, 514, 582	299, 520, 760
1889.....	217, 425, 087	202, 683, 108	1900.....	117, 195, 729	305, 146, 652
1890.....	263, 726, 302	253, 969, 949	1901.....	197, 216, 697	342, 805, 418
1891.....	222, 580, 313	247, 987, 424	1902.....	248, 797, 172	310, 690, 969
1892.....	274, 307, 985	268, 669, 007	1903.....	203, 059, 066	287, 236, 073
1893.....	240, 757, 531	247, 928, 075			

## SWEDEN.

The last twenty years have witnessed a considerable expansion of the beet area outside of the principal countries, to which attention has already been given. To the north of the old confines beets are now raised to a considerable extent in Denmark and southern Sweden; to the southeast, in Roumania; to the south, in Italy, and to the southwest, in Spain.

The first of such countries to become important were the Scandinavian kingdoms of Sweden and Denmark. In Sweden, especially, a rapidly increasing area has been devoted to beet culture. The average extraction obtained in the factories of that country is also high.

Sweden has not yet produced more sugar than will meet the demands of the home market. The legislation in effect consequently looks to holding the home market for domestic sugar and not to its shipment abroad. The import duty on refined sugar and on raw sugar not below No. 18 Dutch standard in color is \$3.99 per 100 pounds (33 crowns per quintal), and on other raw sugar, \$2.86 per 100 pounds (23.5 crowns per quintal). The tax on domestic sugar by the law of May 19, 1893, was imposed on the presumed sugar output and fixed at one-half the rate of the import duty on raw sugar. The legal rate of extraction was fixed in 1901 at 11.5 per cent.<sup>a</sup> A drawback is paid on exported sugar refined from imported, but not from domestic raw sugar.

Sweden was exempted from the provision of the Brussels Convention limiting the amount of surtax on imported sugar as long as it remained a nonexporting country.

## LOCALIZATION OF THE BEET CROP.

The land devoted to sugar beets is located almost entirely in the extreme southern part of the Kingdom. More than three-fourths of the total crop is grown in the little province of Malhösus, immediately across the sound from Denmark.

<sup>a</sup> According to the Deutsche Zuckerindustrie, 1904, p. 690, the legal rate was raised in 1902 to 12 per cent.

The agricultural statistics of Sweden show the beet crop, but, unfortunately, do not specify separately the beet area. From factory reports the average yield per acre may be obtained.<sup>a</sup> By applying the average so obtained to the total beet crop, as officially estimated, it appears that from 1897 to 1901 an annual average of about 62,000 acres was planted in sugar beets out of a total arable area of 8,640,931 acres. About three-fourths of 1 per cent of the arable land was thus devoted to sugar beets. In Malhönus nearly 6 per cent and in Gotland 3 per cent of the arable land was planted in beets.

## SUGAR PRODUCTION.

In 1883-84 Sweden produced less than 7,000,000 pounds of sugar. Since that time its output has increased enormously, reaching 276,000,000 pounds in 1901-2 and 160,000,000 pounds in 1902-3. During this period the average extraction increased from 8 to 14 per cent. (See Table 36.<sup>b</sup>)

TABLE 36.—*Production of sugar beets and of sugar in Sweden, 1883-84 to 1902-3.*

Year ending August 31—	Factories.	Beets used.	Sugar produced.	Average production—	
				Per short ton of beets.	Per cent of beets.
	<i>Number.</i>	<i>Short tons.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Per cent.</i>
1884.....	2	41,699	6,510,600	156	7.81
1885.....	2	51,999	9,477,100	182	9.11
1886.....	3	47,684	8,639,800	181	9.06
1887.....	3	62,153	12,801,700	206	10.30
1888.....	3	92,158	20,229,600	220	10.98
1889.....	4	94,920	19,578,400	206	10.31
1890.....	4	150,809	32,243,400	214	10.69
1891.....	6	240,554	45,484,400	189	9.45
1892.....	8	286,669	59,177,000	206	10.32
1893.....	10	305,825	65,961,400	216	10.78
1894.....	10	412,218	95,167,100	231	11.54
1895.....	17	692,774	160,694,200	232	11.60
1896.....	18	589,895	126,790,300	215	10.75
1897.....	19	981,312	232,709,200	237	11.86
1898.....	19	789,402	196,066,800	248	12.42
1899.....	19	530,131	130,768,500	247	12.33
1900.....	19	685,682	178,155,300	260	12.99
1901.....	19	965,518	252,944,300	262	13.10
1902.....	20	996,250	276,411,200	277	13.87
1903.....	20	556,681	159,710,700	287	14.34

## FOREIGN TRADE IN SUGAR.

Sweden still depends to some extent on foreign countries for its sugar supply. Its imports, however, have steadily decreased with the increase in the domestic industry. Table 37 shows that in 1898 less than 2,000,000 pounds of sugar was received from foreign countries, while in 1883, 90,000,000 pounds were imported. During the years

<sup>a</sup> See Deutsche Zuckerindustrie, 1903, pp. 1105-1106.

<sup>b</sup> Compiled from Deutsche Zuckerindustrie, 1898, p. 744; 1901, pp. 1853-1854; 1902, pp. 337-338; 1903, pp. 1105-1106; 1904, pp. 607-608.

1899 and 1900 the imports increased somewhat, amounting to about 28,000,000 in each of those years, but fell again to less than 2,000,000 pounds in 1901 and 1902.

The exports have generally been of little importance. The legislation of the Kingdom so far looks only to building up an industry capable of supplying its domestic requirements.

TABLE 37.—*Sugar imports and exports of Sweden, 1883-1902.*

Calendar year.	Imports.	Exports.	Calendar year.	Imports.	Exports.	Calendar year.	Imports.	Exports.
	<i>Pounds.</i>	<i>Pounds.</i>		<i>Pounds.</i>	<i>Pounds.</i>		<i>Pounds.</i>	<i>Pounds.</i>
1883.....	89,618,211	2,601	1890.....	91,430,507	763	1897.....	1,964,585	26
1884.....	91,791,581	1,283	1891.....	69,910,066	2,240	1898.....	1,606,970	.....
1885.....	84,318,975	309	1892.....	68,677,466	269,180	1899.....	27,837,842	.....
1886.....	87,537,505	260,222	1893.....	68,794,748	769,297	1900.....	27,995,360	.....
1887.....	88,362,921	43,647	1894.....	46,954,517	5,587	1901.....	1,476,474	11,460
1888.....	84,686,416	7,820	1895.....	9,893,167	2,771	1902.....	1,615,646	.....
1889.....	89,237,427	.....	1896.....	10,633,052	908			

## DENMARK.

## LOCALIZATION OF THE BEET CROP.

Agricultural statistics for 1901 show a total area of arable land in Denmark of 6,401,838 acres. The area devoted to sugar beets was 36,954 acres, or about one-half of 1 per cent of the whole. The beet lands are located almost entirely in the southern part of the islands of the Kingdom. In Maribo about 6 per cent of the total arable area is devoted to beets.

TABLE 38.—*Production of sugar in Denmark, 1883-1903.*

Calendar year.	Factories.	Sugar produced.	Calendar year.	Factories.	Sugar produced.	Calendar year.	Factories.	Sugar produced.
	<i>Number.</i>	<i>Pounds.</i>		<i>Number.</i>	<i>Pounds.</i>		<i>Number.</i>	<i>Pounds.</i>
1883....	3	17,109,946	1890....	6	49,839,788	1897....	7	106,578,959
1884....	5	25,524,839	1891....	6	49,819,291	1898....	7	78,562,398
1885....	6	37,365,438	1892....	6	42,834,501	1899....	7	87,817,739
1886....	6	40,267,150	1893....	6	60,043,274	1900....	7	111,272,155
1887....	6	46,563,735	1894....	6	82,473,412	1901....	7	127,366,087
1888....	6	33,195,626	1895....	6	97,883,418	1902....	7	85,589,261
1889....	6	46,590,542	1896....	6	97,337,059	1903....	(a)	101,113,336

a Not stated.

## SUGAR PRODUCTION.

In 1902 only 7 beet sugar factories were in operation in Denmark, an increase of but 1 since 1885. The output, however, has trebled since that year, having increased from 37,000,000 pounds in 1885 to 127,000,000 pounds in 1901. For 1902 the production fell to 86,000,000 pounds, but increased to 101,000,000 pounds in 1903. (See Table 38.)



## ROUMANIA.

Quite recently a considerable quantity of beets has been grown in Roumania. Relatively, however, the portion of the total arable land devoted to that crop is inconsiderable. While for the five years 1898–1902 the average area of arable land in Roumania was 14,067.556 acres only 21,567 acres were planted in beets. In two of the provinces, Putna and Roman, the beet area amounted to 2 per cent of the total arable land.

## ACREAGE AND PRODUCTION OF SUGAR BEETS.

The total crop of sugar beets in 1890 was only 17,000 short tons. By 1901 it had increased to 281,000. The general contraction of the beet area in 1902 brought the crop down to 144,000 short tons, but in 1903 the crop increased again to 229,000 tons.

In 1898 the highest yield—12 short tons per acre—was obtained. The following year the average yield was only 5 short tons, and in 1903, less than 9 short tons. (See Table 39.)

TABLE 39.—*Acreage and production of sugar beets in Roumania, 1890–1903.*

Year.	Area.	Production.	Average yield per acre.	Year.	Area.	Production.	Average yield per acre.
	<i>Acres.</i>	<i>Short tons.</i>	<i>Short tons.</i>		<i>Acres.</i>	<i>Short tons.</i>	<i>Short tons.</i>
1890.....	(a)	16,843	(a)	1897.....	7,018	53,561	7.63
1891.....	(a)	12,489	(a)	1898.....	14,999	178,529	11.90
1892.....	2,533	20,580	8.12	1899.....	15,246	82,154	5.39
1893.....	(a)	16,964	(a)	1900.....	30,888	260,782	8.44
1894.....	(a)	18,596	(a)	1901.....	31,347	280,847	8.96
1895.....	4,596	36,475	7.94	1902.....	15,357	144,221	9.39
1896.....	5,609	44,974	8.02	1903.....	26,398	229,371	8.69

<sup>a</sup> Not stated.

## SUGAR PRODUCTION.

The largest quantity of sugar produced in Roumania was in 1901–2, when the crop amounted to 57,030,744 pounds. During 1900–1901 the total output was 52,414,184 pounds, and during 1902–3, 36,047,939 pounds.<sup>a</sup>

The Roumanian Government did not sign the Brussels Convention. A consumption tax of \$2.63 per 100 pounds (30 lei per quintal) is imposed on all sugar, imported or domestic. Domestic sugar receives a direct bounty of \$1.40 per 100 pounds (16 lei per quintal), but by law of December, 1901, an export duty equal in amount is imposed on such sugar shipped abroad. The import duty is \$2.19 per 100 pounds on raw and \$3.06 on refined (25 and 35 lei, respectively, per quintal).

<sup>a</sup> Deutsches Handels-Archiv, 1904, II, p. 22.

## ITALY.

## LOCALIZATION OF THE BEET CROP.

In 1899 the area devoted to sugar beets in Italy was 26,835 acres.<sup>a</sup> While the area of arable land can not be ascertained precisely, it is roughly estimated that sugar beets occupied a little more than 1 per cent of the cultivated land in the Provinces of Verona and Ancona, and over one-half per cent in Cuneo, Forli, and Bologna.

Since 1899 there has been a large expansion of the beet-sugar industry, especially in the Compartimenti Emilia and Venetia.<sup>b</sup> During the sugar year 1902-3 Emilia furnished one-half of the total sugar produced and Venetia about one-fourth.

## LEGISLATION.

The import duty on raw sugar was gradually increased during the decade 1884-1894 from \$4.64 to \$7.70 per 100 pounds (from 53 to 88 lire per quintal) and the excise from \$2.82 to \$5.88 (from 32.20 to 67.20 lire per quintal), a constant advantage of \$1.82 per 100 pounds being maintained in favor of domestic sugar. On refined sugar the import duty was fixed in 1894 at \$8.67 and the excise in 1893 at \$6.14 per 100 pounds (99 and 70.15 lire per quintal, respectively), the rates now in force. Under the Brussels Convention, as long as Italy remains a non-exporting country, its surtax on foreign sugar is not limited. Prior to July, 1903, an additional advantage was given domestic sugar by the provision permitting the tax to be liquidated according to the presumed output, calculated from the quantity and density of the juice. For the same reason the sugar output for earlier years is doubtless understated.

## SUGAR PRODUCTION.

During the year ending June 30, 1898, less than 9,000,000 pounds of sugar were produced. But in the next six years the output increased to nearly 300,000,000 pounds. (See Table 40.) This remarkable growth of the sugar industry led to an agreement among the various factories in April, 1904, having for its object limitation of the output and maintenance of prices. One refinery, which refused to become a party to the agreement, was purchased at a high price and converted into a corporation, the stock being subscribed by the combining factories.<sup>c</sup>

<sup>a</sup> Notizie sulla Agricoltura in Italia, p. 39. This report was prepared by the Ministry of Agriculture for the Paris Exposition of 1900.

<sup>b</sup> The Province of Verona is situated in the Compartimento of Venetia and the Provinces of Bologna and Forli in Emilia.

<sup>c</sup> Deutsche Zuckerindustrie, 1904, p. 738, Journal des fabricants de sucre, April 27, 1904.

TABLE 40.—*Production of sugar in Italy, 1885-1904. a*

Year ending June 30—	Fac- tories.	Sugar pro- duced.	Year ending June 30—	Fac- tories.	Sugar pro- duced.	Year ending June 30—	Fac- tories.	Sugar pro- duced.
	No.	Pounds.		No.	Pounds.		No.	Pounds.
1885.....	1	1,592,400	1892.....	2	3,466,500	1899.....	4	13,166,800
1886.....	1	276,000	1893.....	2	2,349,000	1900.....	13	50,961,100
1887.....	1	389,800	1894.....	2	2,528,900	1901.....	28	132,552,500
1888.....	1	404,800	1895.....	2	4,607,200	1902.....	33	163,799,400
1889.....	1	986,600	1896.....	2	5,836,700	1903.....	32	210,339,000
1890.....	1	1,401,700	1897.....	2	5,069,700	1904.....	34	287,000,000
1891.....	1	1,738,100	1898.....	4	8,547,200			

*a* Compiled from the *Anuario statistico italiano*, 1900, p. 494; *Bollettino di legislazione e statistica doganale e commerciale*, Vol. XX, pp. 1184, 1192; *Deutsche Zuckerindustrie*, 1902, p. 1335, 1904, p. 821; *Journal des fabricants de sucre*, June 1, 1904.

## FOREIGN TRADE IN SUGAR.

Notwithstanding the rapid increase in the domestic industry, Italy still imports some sugar from abroad. The quantity of its imports has, however, fallen off largely in recent years, as shown in Table 41.

TABLE 41.—*Sugar imports and exports of Italy, 1883-1903.*

Calendar year.	Imports.	Exports.	Calendar year.	Imports.	Exports.	Calendar year.	Imports.	Exports.
	Pounds.	Pounds.		Pounds.	Pounds.		Pounds.	Pounds.
1883.....	204,237,200	.....	1890.....	201,210,300	.....	1897.....	168,861,400	16,100
1884.....	211,643,600	.....	1891.....	185,947,700	.....	1898.....	161,153,200	8,200
1885.....	334,792,500	.....	1892.....	185,311,200	51,400	1899.....	138,205,500	6,000
1886.....	124,828,400	.....	1893.....	178,517,700	20,500	1900.....	119,425,200	9,300
1887.....	307,261,300	657,400	1894.....	166,043,600	79,800	1901.....	84,759,600	9,900
1888.....	91,643,200	.....	1895.....	160,742,000	65,700	1902.....	47,355,000	16,500
1889.....	172,355,900	.....	1896.....	163,210,800	117,500	1903.....	14,477,400	11,700

## SPAIN.

Spain formerly drew the bulk of its sugar supply from its island colonies. Cane was raised to some extent in the southern part of the Kingdom, and more recently beets were introduced. The loss of the Spanish colonies resulted in a large expansion of the domestic industry. The effects were most marked in the beet-sugar industry, which was not so strictly limited by climatic conditions as the cane product. Imported foreign sugar was formerly subject to a duty of \$7.20 per 100 pounds (82.25 pesetas per quintal), and colonial sugar paid a duty of \$2.93 per 100 pounds (33.50 pesetas per quintal). Domestic sugar was liable to a consumption tax of \$1.75 per 100 pounds (20 pesetas per quintal). The quantity of domestic sugar subject to taxation is estimated at 5 per cent of the quantity of cane or beets used by the factories. By the law of December 19, 1899, the duty on imported sugar was raised to a uniform rate of \$7.44 per 100 pounds (85 pesetas per quintal), and the tax on domestic sugar to \$2.19 per 100 pounds (25 pesetas per quintal). Spain was represented at the Brussels Conference, but did not subsequently ratify the convention.

## LOCALIZATION OF THE BEET CROP.

Spanish agricultural statistics do not show the total area of arable land, but the area in principal crops in 1902 was 20,273,250 acres. Of this, 52,773 acres, about one-fourth of 1 per cent, were devoted to sugar beets. The provinces in which sugar beets occupied the largest proportion of the cultivated land were Granada and Malaga, in the south; Saragossa, toward the northeast, and Oviedo, Alava, and Navarra, in the north.

## SUGAR PRODUCTION.

The beet-sugar industry has suddenly grown into prominence. In 1896-97 less than 2,000,000 pounds of beet sugar were produced in the Kingdom. In 1899-1900 the beet-sugar production reached 113,000,000 pounds, and in 1903-4 207,000,000 pounds. The average extraction has been low, varying from 8 to 11 per cent. (See Table 42.)

TABLE 42.—*Production of beet sugar and cane sugar in Spain, 1897-1903.<sup>a</sup>*

Factory year.	Beets used.	Beet sugar produced.	Average extraction per cent of beets.	Year.	Cane crushed.	Cane sugar produced.	Average extraction per cent of cane.
	<i>Short tons.</i>	<i>Pounds.</i>	<i>Per cent.</i>		<i>Short tons.</i>	<i>Pounds.</i>	<i>Per cent.</i>
1896-97.....	11,790	1,839,000	7.80	1899.....	(c)	65,375,000	(c)
1899-1900.....	540,841	113,334,000	10.48	1900.....	395,485	74,551,000	9.43
1900-1901.....	781,812	124,450,000	7.96	1901.....	320,477	60,430,000	9.43
1901-2.....	609,942	104,696,000	8.58	1902.....	245,551	35,787,000	7.29
1902-3 <sup>b</sup> .....	738,276	152,821,000	10.35	1903 <sup>d</sup> .....	(c)	47,132,000	(c)
1903-4 <sup>b</sup> .....	929,788	207,060,000	11.13				

<sup>a</sup> According to the Journal des fabricants de sucre, Mar. 17, 1897; Feb. 26, 1902; July 16, 1902; May 20, Nov. 25, 1903; May 4, 1904; and the Deutsche Zuckerindustrie, 1897, p. 420; 1900, p. 1526; 1902, p. 363; 1903, p. 504.

<sup>b</sup> To end of March.

<sup>c</sup> Not stated.

<sup>d</sup> Nine months ending September 30.

The cane-sugar industry is much older than the beet. In 1903, however, possibly owing to increased competition with the beet product, only 47,000,000 pounds of cane sugar were produced as compared with 75,000,000 for 1900. The average extraction for the years 1900 and 1901 was 9 per cent, and for 1902 7 per cent.

The annual consumption of sugar in Spain was officially estimated at the time of the Brussels conference at from 175,000,000 to 200,000,000 pounds. The output of the domestic factories now exceeds this amount. To prevent a decline in prices owing to excessive production, a large corporation was formed in 1903, heavily capitalized, combining most of the sugar producers of Spain. The new combination entered into an agreement with the few independent producers for the purpose of apportioning the output and maintaining prices.<sup>a</sup>

<sup>a</sup> See Deutsche Zuckerindustrie, 1903, p. 1836; Board of Trade Journal, Vol. XLIV, pp. 184-185.



The average price of white sugar in Spain for six years was as follows<sup>a</sup>: 1896-97, 7.52 cents per pound; 1897-98, 7.21 cents; 1898-99, 9.44 cents; 1899-1900, 10.34 cents; 1900-1901, 8.44 cents; 1901-2, 9.13 cents.

## FOREIGN TRADE IN SUGAR.

In 1883 about 100,000,000 pounds of sugar were imported into Spain. In 1902 the imports amounted to only 141,000 pounds, and in 1903 to 301,000 pounds. After 1899 sugar imported from Cuba, Porto Rico, and the Philippine Islands was made subject to the full import duty. Practically all of the imports received by Spain prior to 1900 came from those islands. After 1886 the imports from all other countries combined fell below 4,000,000 pounds each year. (See Table 43.)

TABLE 43.—*Sugar imports and exports of Spain, 1883-1903.*

Calendar year.	Imports.					Exports.
	Total.	From Cuba. <sup>a</sup>	From Porto Rico. <sup>a</sup>	From Philippine Islands. <sup>a</sup>	From other countries.	
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
1883.....	98,159,213	28,660,488	11,471,925	16,361,084	41,665,716	.....
1884.....	119,085,935	39,549,067	11,600,160	19,065,533	48,821,175	.....
1885.....	117,057,291	81,424,615	15,020,403	9,174,701	11,437,572	123,524
1886.....	126,913,835	90,030,619	19,169,861	11,603,513	6,109,842	.....
1887.....	116,312,897	82,101,460	21,408,136	9,684,016	3,119,285	.....
1888.....	107,661,257	77,104,712	19,342,814	10,074,387	1,139,344	26,742
1889.....	120,347,233	78,123,533	27,791,827	12,876,606	1,555,267	15,917
1890.....	168,046,517	114,569,226	44,383,490	7,216,359	1,877,442	12,454
1891.....	110,933,135	80,780,898	24,417,303	4,123,612	1,611,322	20,342
1892.....	168,625,778	117,761,467	40,987,196	6,269,827	3,607,288	50,992
1893.....	56,118,272	22,760,716	23,419,320	6,235,738	3,702,498	11,651
1894.....	93,903,429	53,452,712	28,878,307	8,788,700	2,783,710	621,790
1895.....	103,460,498	59,426,728	30,314,762	11,682,072	2,036,936	384,006
1896.....	83,183,085	32,282,449	40,889,208	7,976,503	2,034,925	11,828
1897.....	61,871,989	10,472,983	41,351,929	6,066,468	3,980,609	49,215
1898.....	19,141,382	3,934,305	13,298,793	659,707	1,248,577	12,509
1899.....	20,506,446	17,443,516	193,654	4,643	2,861,633	5,827
1900.....	1,009,017	27,919	201,996	60	779,042	4,125
1901.....	211,362	15,170	34,705	141	161,346	1,942
1902.....	141,302	8,728	9,912	.....	122,662	8,583
1903.....	301,195	(b)	(b)	(b)	(b)	(b)

<sup>a</sup> Prior to 1899 comprising only sugar of colonial production accompanied by certificate of origin.

<sup>b</sup> Not stated.

## CANE-SUGAR PRODUCTION.

Attention has already been called to the remarkable increase in the production of beet sugar relative to the production of cane sugar. In 1899-1900 beet sugar constituted no less than 64 per cent of the total visible sugar production of the world. This was due not only to the enormous increase in the output of beet-producing countries, but also to the temporary cessation of the Cuban supply of cane sugar. Owing to the resumption of sugar production by Cuba and the restriction of the beet-sugar output the commercial production of cane sugar increased from 36 per cent of the world's crop in 1899-1900 to 42 per cent in 1902-3 and 1903-4. If allowance were made

<sup>a</sup> See Journal des fabricants de sucre, January 21, 1903.

for the cane-sugar product omitted from commercial statistics more than half of the total production would be found to consist of cane sugar.

Of the cane-sugar output for 1903-4, Cuba produced no less than 24 per cent, Java about 21 per cent, Hawaii 8 per cent, and Louisiana 5 per cent. Considerably more than half of the visible cane-sugar production of the world was thus supplied by the first three sources named. (See Plate III.)

Sugar statistics for cane-growing countries are, in general, by no means so complete or so accurate as for beet-growing countries. The sugar problem of the world is most closely associated with the beet-sugar industry. No attempt will be made to treat exhaustively of the cane-sugar industry, but the conditions of production in Cuba, Java, Hawaii, and Louisiana <sup>a</sup> will be briefly described.

### CUBA.

#### SUGAR PRODUCTION.

The Cuban sugar industry during the year 1903-4 is estimated to have furnished nearly one-fourth of the entire visible cane-sugar product of the world.

The decline of the Cuban output from more than 2,250,000,000 pounds in 1894-95 to 500,000,000 in 1895-96 shows strikingly the effect of the war on the industrial life of the island. Of the 574 sugar factories on the island <sup>b</sup> 483 were destroyed during the war. Less than 12 per cent of the number existing at the outbreak of the war were left.

The recovery of the industry from the effects of the war has been rapid. The estimated production for 1903-4 reached 2,307,000,000 pounds. The output for that year was surpassed only by that for 1893-94. (See Table 44.<sup>c</sup>)

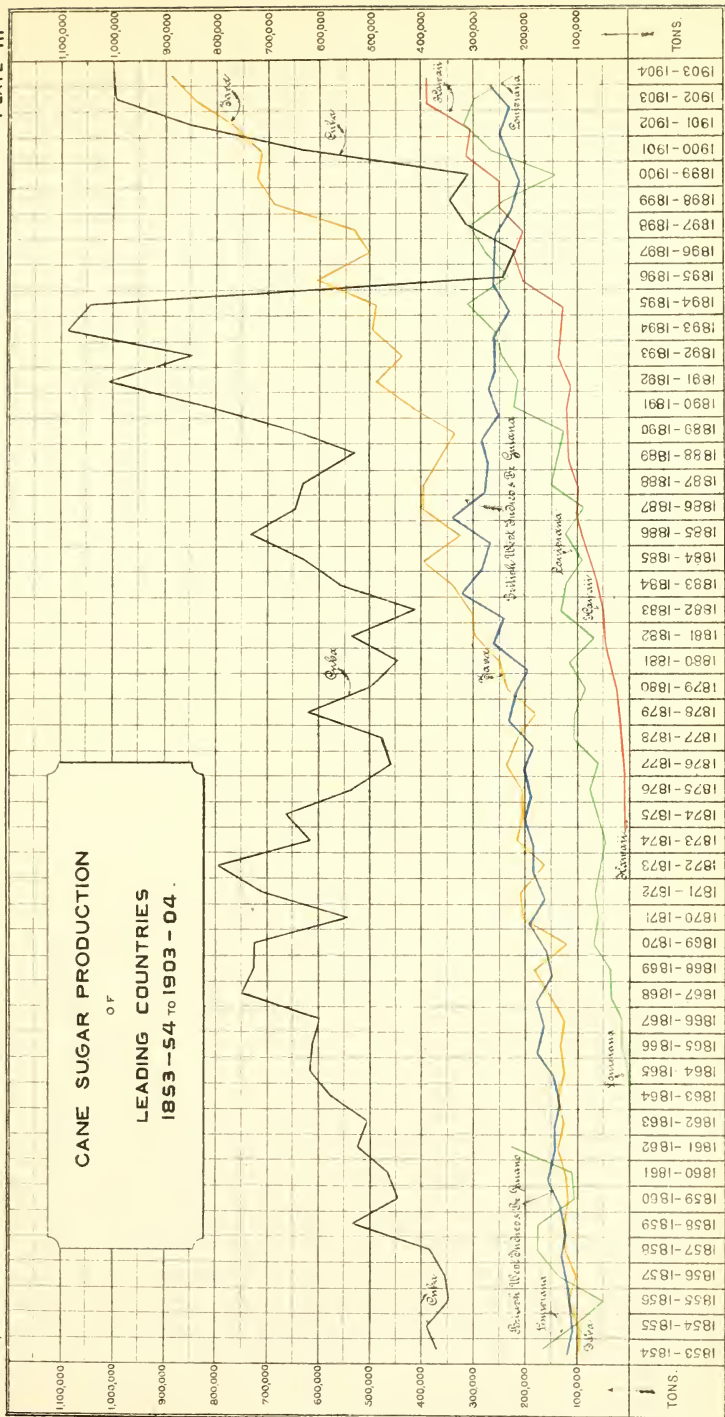
TABLE 44.—*Production of sugar in Cuba, 1880-81 to 1903-4.*

Crop year.	Production.		Crop year.	Production.	
	<i>Long tons.</i>	<i>Pounds.</i>		<i>Long tons.</i>	<i>Pounds.</i>
1880-81.....	493, 764	1, 105, 031, 360	1892-93.....	815, 894	1, 827, 602, 560
1881-82.....	595, 837	1, 331, 674, 880	1893-94.....	1, 051, 214	2, 361, 439, 360
1882-83.....	460, 397	1, 031, 289, 280	1894-95.....	1, 004, 264	2, 219, 551, 360
1883-84.....	553, 987	1, 240, 930, 880	1895-96.....	225, 221	504, 495, 040
1884-85.....	631, 967	1, 415, 606, 080	1896-97.....	212, 051	474, 994, 240
1885-86.....	731, 723	1, 639, 059, 520	1897-98.....	305, 543	684, 416, 320
1886-87.....	646, 578	1, 448, 334, 720	1898-99.....	345, 260	773, 382, 400
1887-88.....	656, 719	1, 471, 050, 560	1899-1900.....	308, 543	691, 136, 320
1888-89.....	560, 333	1, 255, 145, 920	1900-1901.....	635, 856	1, 424, 317, 440
1889-90.....	632, 368	1, 416, 501, 320	1901-2.....	850, 181	1, 904, 405, 440
1890-91.....	819, 760	1, 836, 262, 400	1902-3.....	998, 878	2, 237, 486, 720
1891-92.....	976, 789	2, 188, 007, 360	1903-4.....	1, 030, 000	2, 307, 200, 000

<sup>a</sup> For Louisiana, see pp. 91-93.

<sup>b</sup> Exclusive of the Province of Santiago. The statistics given are taken from the Civil Report of the Military Governor of Cuba, 1900, Vol. VII, p. 295. See also *ibid.*, 1901, Vol. VII.

<sup>c</sup> Compiled from Willett & Gray, December 31, 1902, and September 22, 1904. Reports of the Cuban Department of Agriculture, Commerce, and Industry return the sugar output for 1900-1901 at 1,392,381,000 pounds, for 1901-2 at 1,952,453,800 pounds, and for 1902-3 at 2,302,603,400 pounds.







## LOCALIZATION.

According to the census of Cuba for 1899,<sup>a</sup> taken by the United States War Department, nearly one-half of the entire cultivated land was devoted to sugar cane. The area of cultivated land was 896,381 acres, while sugar cane alone occupied 423,917 acres, or 47 per cent of the whole. In the Province of Matanzas 78 per cent of the cultivated land was in sugar cane; in Santa Clara, 71 per cent; in Puerto Principe and Santiago, 35 per cent; in Habana, 27 per cent; and in Pinar del Rio, 6 per cent.

## AVERAGE YIELD.

The agricultural report of Cuba for 1900<sup>b</sup> estimated the average yield at 21 short tons of cane per acre of good land (about 50,000 to 60,000 arrobas per caballeria), and the average sugar extraction at 10.50 to 11 per cent, or about 4,500 pounds of sugar per acre. In 1899 sugar cane occupied 422,486 acres, and in 1899-1900 the output was 691,136,320 pounds of sugar, an average of only 1,636 pounds per acre. That yield was undoubtedly much below the normal. Unfortunately no statistics of acreage are available for later years. Official statistics of production show an average extraction of 9.71 per cent in 1900-1901, 9.95 per cent in 1901-2, and 9.69 per cent in 1902-3.

## JAVA.

During the cessation of the Cuban industry Java was the leading source of cane sugar. It is now second only to Cuba. During the sugar year 1903-4 it is estimated that Java alone produced more than one-fifth of the total cane-sugar product of the world, so far as included in commercial statistics.

An export duty of 5 cents per 100 pounds (0.30 florin per quintal) was collected prior to 1887. The duty was then reduced to one-half and was suspended from June 1, 1887, to December 31, 1893, and from June 1, 1895, to May 31, 1896. It was finally abolished by the law of February 1, 1898.

## LAND TENURE.

The land tenure of Java is quite complicated. The Dutch Government holds the title to a large part of the land. In two provinces—Soerakarta and Djokjakarta—native princes control the land. The bulk of the land in private hands is owned by the natives, who lease part of it to sugar factories for a single crop year. Part of the Government land formerly passed into private ownership. The Government no longer alienates any land, but since 1870 has granted it on hereditary lease (*emphyteusis*) for a term of seventy-five years.

<sup>a</sup> Census of Cuba, 1899, pp. 543-549.

<sup>b</sup> Civil Report of the Military Governor of Cuba, 1900, Vol. VII, pp. 48-49.

## SUGAR PRODUCTION.

During the last twenty years the sugar production of Java has increased threefold. In 1882 the total production was 654,000,000 pounds. In 1901 it amounted to 1,780,000,000 pounds, and in the following year to nearly 2,000,000,000 pounds.

Until about 1875 practically the entire sugar industry was operated directly by the Government. It was then decided to bring the industry gradually under private control. The Government made contracts with factories to work cane grown on Government land, but required them to supplement such supplies with cane grown on land under private ownership. Government culture was to be decreased annually and private culture to increase. After 1891 Government culture and manufacture under Government contract came to an end.

Factories growing cane on lands annually leased from the natives increased their output from 80,000,000 pounds in 1882 to 222,000,000 pounds in 1891. The following year this class, including the factories that had previously operated under contract with the Government, had a sugar output of 764,000,000 pounds. In 1902 sugar factories of this class produced 1,575,000,000 pounds out of a total production for the island of 1,963,000,000 pounds. Factories using cane grown on lands of native princes produced 285,000,000 pounds. The remainder, 103,000,000 pounds, was extracted from cane grown on lands owned or leased for long periods by Europeans and Chinese. (See Table 45.)

TABLE 45.—*Production of sugar in Java, 1882–1902.*<sup>a</sup>

Year.	Total.	From cane grown on land—				
		Under Gov- ernment cul- ture.	Leased from natives.	In native principali- ties. <sup>b</sup>	Leased from Government.	Under pri- vate own- ership.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
1882.....	654,067,800	439,776,400	79,745,700	109,622,500	17,068,100	7,855,100
1883.....	727,445,900	490,389,400	99,679,800	111,662,100	14,193,600	11,521,000
1884.....	883,081,700	550,067,500	147,935,900	155,922,500	15,495,300	13,660,500
1885.....	851,272,300	516,121,400	152,681,400	154,003,500	14,749,600	13,716,400
1886.....	862,051,000	505,594,600	175,041,100	150,823,600	16,902,800	13,688,900
1887.....	893,364,400	537,708,400	185,213,400	141,819,700	16,255,400	12,367,500
1888.....	853,826,600	513,351,400	186,022,700	120,597,600	20,514,900	13,340,000
1889.....	792,804,100	499,118,500	181,258,300	89,900,500	8,616,700	13,910,100
1890.....	931,009,200	568,678,100	205,761,900	116,293,200	26,954,400	13,321,600
1891.....	957,319,600	556,732,700	222,305,700	145,236,400	21,476,200	11,568,600
1892.....	949,137,500	.....	764,151,900	149,634,000	26,990,800	8,357,800
1893.....	1,104,582,200	.....	898,928,000	163,008,900	29,467,600	13,177,700
1894.....	1,097,960,400	.....	908,881,500	164,399,100	13,103,200	11,576,600
1895.....	1,254,603,800	.....	1,016,681,300	185,083,200	40,908,100	11,931,200
1896.....	1,149,208,400	.....	926,684,600	178,440,400	31,793,400	12,290,000
1897.....	1,245,017,300	.....	993,956,300	195,109,000	44,144,900	11,807,100
1898.....	1,569,475,500	.....	1,271,802,900	220,364,800	62,000,600	15,307,200
1899.....	1,640,892,800	.....	1,331,812,200	231,515,900	62,194,600	15,340,100
1900.....	1,638,007,800	.....	1,318,406,200	230,243,800	73,666,000	15,691,800
1901.....	1,780,428,800	.....	1,455,753,500	226,655,900	82,395,200	15,624,200
1902.....	1,963,310,300	.....	1,575,002,300	285,455,300	84,928,900	17,923,800

<sup>a</sup> Data prior to 1888 from Van den Berg, quoted in *Das Zuckerrohr und seine Kultur*, by W. Krüger, p. 551; for subsequent years from the Jaareijfers.

<sup>b</sup> Soerakarta and Djokjakarta in central Java.

AVERAGE YIELD.

Complete statistics of acreage and cane crushed are not available. The results obtained by the sugar industry, as tabulated by the Archief voor de Java Suikerindustrie, show an average yield of from 30 to 40 short tons of cane per acre and an average extraction of  $9\frac{1}{2}$  to 11 per cent. The net sugar production per acre has varied from 6,600 pounds in 1894 to 8,300 pounds in 1899. (See Table 46.) These results indicate a much higher yield of cane per acre than in Cuba.

TABLE 46.—*Results obtained in the Java sugar industry, 1894–1903.*<sup>a</sup>

Year.	Average yield of cane.		Average sugar produced.		
	Per bouw.	Per acre.	Per bouw.	Per acre.	Per cent of cane. <sup>b</sup>
	<i>Piculs.</i>	<i>Short tons.</i>	<i>Piculs.</i>	<i>Pounds.</i>	<i>Per cent.</i>
1894.....	782	30.32	85 $\frac{1}{2}$	6,629	10.36
1895.....	888	34.43	90 $\frac{3}{4}$	7,036	9.79
1896.....	789	30.59	86 $\frac{7}{8}$	6,736	10.55
1897.....	875	33.92	91 $\frac{1}{4}$	7,075	10.06
1898.....	1,011	39.19	106	8,219	10.21
1899.....	949	36.79	106 $\frac{1}{2}$	8,258	10.94
1900.....	979	37.95	96	7,444	9.57
1901.....	888	34.43	92 $\frac{1}{2}$	7,153	10.16
1902.....	c 80,242	35.80	c 8,930	7,967	10.77
1903.....	d 711	39.82	d 71	7,952	10.04

<sup>a</sup> Data from the Deutsche Zuckerindustrie, 1903, pp. 850, 1161, and International Sugar Journal, 1904, p. 339. The statistics are apparently obtained originally from the Archief voor de Java Suikerindustrie.

<sup>b</sup> The percentages given are somewhat lower than would be obtained by dividing the average yield of cane per bouw into the average production of sugar per bouw. The difference is probably to be explained by the inclusion of so-called sack sugar at its actual weight in the preceding column (except for 1903), but only at half its actual weight in calculating this column.

<sup>c</sup> Kilograms per hectare.

<sup>d</sup> Hundredweight per acre.

PRICES.

The prices of sugar in Java are shown in Table 47. They have followed very closely the marked decline in the export prices of beet sugar. In 1883 the average price was  $4\frac{1}{4}$  cents per pound; in 1903, less than  $1\frac{3}{4}$  cents.

TABLE 47.—*Average price of raw sugar No. 15 Dutch standard*<sup>a</sup> in Java, 1883–1903.

Calendar year.	Per pound.	Calendar year.	Per pound.	Calendar year.	Per pound.	Calendar year.	Per pound.
	<i>Cents.</i>		<i>Cents.</i>		<i>Cents.</i>		<i>Cents.</i>
1883.....	4.28	1889.....	2.93	1894.....	2.34	1899.....	2.06
1884.....	3.29	1890.....	2.44	1895.....	1.42	1900.....	2.11
1885.....	3.00	1891.....	2.50	1896.....	2.38	1901.....	1.95
1886.....	2.73	1892.....	2.57	1897.....	1.98	1902.....	1.63
1887.....	2.71	1893.....	2.88	1898.....	1.98	1903.....	1.71
1888.....	2.77						

<sup>a</sup> Prior to 1896 No. 14 Dutch standard.

## EXPORTS.

The exports of sugar from Java during the last twenty years increased from 700,000,000 pounds in 1883 to 1,900,000,000 pounds in 1903. (See Table 48.<sup>a</sup>) Shipments to the Netherlands were small.

TABLE 48.—*Exports of sugar from Java, 1882-1903.*

Calendar year.	Pounds.	Calendar year.	Pounds.	Calendar year.	Pounds.	Calendar year.	Pounds.
1882.....	683,708,000	1888.....	828,257,000	1894.....	916,807,000	1899.....	1,713,638,076
1883.....	663,935,000	1889.....	696,080,000	1895.....	1,269,098,000	1900.....	1,623,904,000
1884.....	790,971,000	1890.....	810,808,000	1896.....	1,261,335,000	1901.....	1,595,393,334
1885.....	926,741,000	1891.....	1,021,936,000	1897.....	1,142,649,000	1902.....	1,904,348,584
1886.....	738,492,000	1892.....	937,757,000	1898.....	1,512,531,961	1903.....	1,919,459,000
1887.....	852,896,000	1893.....	1,118,801,000				

NOTE.—The quantity of sugar exported to the United States for certain years was as follows: 1898, 930,448,822 pounds; 1899, 1,223,800,028 pounds; 1901, 707,564,302 pounds; 1902, 968,208,201 pounds. The shipments to the United States formed 61.52 per cent of the total sugar exports in 1898, 71.42 per cent in 1899, 44.35 per cent in 1901, and 50.84 per cent in 1902.

In 1899 over 71 per cent of the total sugar exports of Java were destined for the United States. In 1902, notwithstanding the increased receipts from Cuba, the United States took 51 per cent of the total shipments from Java. The other half of the sugar exports in that year went to neighboring countries of the East. China alone received over one-fourth of the total exports, while nearly all of the last fourth was shipped to Australia, Japan, the Straits Settlements, and India. The sugar exports both to the Netherlands and the United Kingdom formed only one-half of 1 per cent of the total in 1902.

## HAWAII.

More than three-fourths of the total cultivated land in Hawaii was devoted to sugar cane in 1899. The total cultivated area, according to the United States census of 1900, was 86,854 acres; the acreage in sugar cane, 65,687.

## ACREAGE AND SUGAR PRODUCTION.

In 1895 the area planted in cane was 47,000 acres and by 1901 it had increased to 79,000. The production of sugar increased much more rapidly. In 1895 the total production amounted to less than 300,000,000 pounds; by 1901 it had increased to 720,000,000 pounds. The average yield per acre in the earlier year was only 6,300 pounds of sugar, and in 1901, 9,200 pounds. (See Table 49.<sup>b</sup>) These results in most years exceed even those obtained in Java.

<sup>a</sup> For 1898, 1899, 1901, and 1902 from the *Statistik vanden Handel, de Scheepvaart en de In- en Uitvoerrechten in Nederlandsch Indie*; for other years, from the *Jaarcijfers*.

<sup>b</sup> Compiled from the *Hawaiian Planters' Monthly*, vol. 21, p. 625; vol. 22, p. 186.



TABLE 49.—*Acreage in sugar cane and production of sugar in Hawaii, 1895-1901.*

Year.	Area in cane.	Sugar pro- duced.	Average yield per acre.	Year.	Area in cane.	Sugar pro- duced.	Average yield per acre.
	<i>Acres.</i>	<i>Pounds.</i>	<i>Pounds.</i>		<i>Acres.</i>	<i>Pounds.</i>	<i>Pounds.</i>
1895.....	47,400	299,254,000	6,313	1899.....	60,308	565,614,000	9,379
1896.....	55,729	451,656,000	8,105	1900.....	66,773	579,088,000	8,672
1897.....	53,826	502,252,000	9,331	1901.....	78,619	720,076,000	9,159
1898.....	55,236	458,828,000	8,307				

In 1899, according to the Twelfth Census of the United States, 2,239,376 tons of cane were harvested in Hawaii. Practically all of the cane was made into sugar on the plantation. Only 172,544 short tons of cane were sold, at an average price of \$4.23 per ton. From each acre of land no less than 34 tons were obtained—about twice the usual yield in Louisiana and but slightly less than that in Java. In Louisiana, moreover, nearly one-third of the crop had to be retained for use as plant cane, while in Hawaii all the cane harvested was crushed.<sup>a</sup> In Hawaii, as in Java, sugar cane is raised very largely by means of irrigation.

The sugar production of the islands in 1899-1900 was returned by the census at 542,098,500 pounds and the production of molasses at 4,702,292 gallons. Most of the molasses produced had no selling value, owing to the almost complete extraction of the saccharine matter in the form of sugar. From each short ton of cane crushed an average of 242 pounds of sugar were obtained, or 12.10 per cent of the weight of the cane, and from each acre 8,253 pounds of sugar. The average extraction was remarkably high, exceeding the highest recorded for Java by more than 1 per cent.

#### EXPORTS.

Practically the entire sugar production of Hawaii is shipped abroad, mostly to the United States. Consequently the exports indicate very closely the output of the insular industry. During the quarter of a century that the reciprocity treaty was in effect Hawaiian exports increased from 25,000,000 pounds in 1875 to 545,000,000 in 1899. Under American sovereignty the exports further increased to 775,000,000 pounds in 1902-3 and 736,000,000 pounds in 1903-4. (See Table 50.<sup>b</sup>) With the improved methods of sugar production there has been a continually decreasing exportation of molasses.

<sup>a</sup>Twelfth Census, Vol. VI, pp. 459, 462.

<sup>b</sup>Prior to 1901, from the Hawaiian Annual, 1902, p. 39, for the last four fiscal years, from official commercial statistics of the United States.

TABLE 50.—*Exports of sugar and molasses from Hawaii, 1875-1904.*

Year. <sup>a</sup>	Sugar.			Molasses.		
	Quantity.	Value.	Average price.	Quantity.	Value.	Average price.
	<i>Pounds.</i>	<i>Dollars.</i>	<i>Cents.</i>	<i>Gallons.</i>	<i>Dollars.</i>	<i>Cents.</i>
1875.....	25,080,182	1,216,389	4.85	93,722	12,184	13.00
1876.....	26,072,429	1,272,335	4.88	130,073	19,511	15.00
1877.....	25,575,965	1,777,530	6.95	151,462	22,719	15.00
1878.....	38,431,458	2,701,732	7.03	93,136	12,108	13.00
1879.....	49,020,972	3,109,564	6.34	87,475	9,623	11.00
1880.....	63,584,871	4,322,711	6.80	198,355	29,754	15.00
1881.....	93,789,483	5,395,400	5.75	263,587	31,630	12.00
1882.....	114,177,938	6,320,891	5.54	221,293	33,194	15.00
1883.....	114,107,155	7,112,981	6.23	193,997	34,819	17.95
1884.....	142,654,923	7,328,897	5.14	110,530	16,580	15.00
1885.....	171,350,314	8,356,062	4.88	57,941	7,050	12.15
1886.....	216,223,615	9,775,132	4.52	113,137	14,502	12.82
1887.....	212,763,647	8,694,904	4.09	71,222	10,523	14.77
1888.....	235,888,346	10,818,883	4.59	47,965	5,900	12.30
1889.....	242,165,835	13,089,302	5.41	54,612	6,185	11.33
1890.....	259,789,462	12,159,585	4.68	74,926	7,603	10.15
1891.....	274,983,580	9,550,538	3.47	55,845	4,721	8.45
1892.....	263,636,715	7,276,549	2.76	47,988	5,061	10.55
1893.....	330,822,879	10,200,958	3.08	67,282	5,929	8.81
1894.....	306,684,993	8,473,009	2.76	72,979	6,050	8.29
1895.....	294,784,819	7,975,590	2.71	44,970	3,038	6.76
1896.....	443,569,282	14,932,173	3.37	15,885	1,210	7.62
1897.....	520,158,232	15,390,422	2.96	33,770	2,893	8.57
1898.....	444,963,036	16,614,623	3.73	14,537	919	6.32
1899.....	545,370,537	21,898,191	4.02	11,455	359	3.13
1900.....	344,531,173	13,919,400	4.04	120	10	8.33
1901.....	690,882,132	27,094,155	3.92	93,820	4,615	4.92
1902.....	720,554,068	23,920,152	3.32	48,036	2,187	4.55
1903.....	774,825,420	25,310,684	3.27	10	1	(b)
1904.....	736,491,992	24,359,385	3.31	11,187	712	6.36

<sup>a</sup> Prior to 1900, calendar years; for 1900, the period January 1-June 14; for 1901, the period June 15, 1900-June 30, 1901; subsequently, years ending June 30.

<sup>b</sup> Exports too small to justify the calculation of an average price.

### SUGAR-IMPORTING COUNTRIES.

The United Kingdom and the United States import more sugar than any other countries. While the former has important sugar-producing colonies and the latter a considerable domestic production, both countries import a large quantity of sugar. With sugar production in many countries far in excess of domestic needs it has become increasingly necessary and increasingly difficult to find foreign markets for the surplus production.

#### UNITED KINGDOM.

The United Kingdom is the great sugar market of the world. In that country both beet and cane sugar compete on equal terms, save for the advantage the former derives from lower freight rates. No advantage whatever has been granted in favor of the British colonies. British prices represent the equilibrium reached as the result of competition between the beet and cane product.

Extremely low sugar prices have prevailed. But the competition which the British sugar colonies have been compelled to meet has been severe. For several years the West Indian colonies have depended on the United States for a market. The unsatisfactory conditions in those colonies seemed in the opinion of the British Government to

render some change imperative, and the British delegates to the Brussels Conference were instructed to insist on the repeal of the continental sugar bounties.

On April 19, 1901, a duty of 91 cents per 100 pounds (4s. 2d. per cwt.) was imposed on refined sugar and a duty on raw sugar varying according to polariscopic test. The duty on raw sugar in 1903 averaged 73 cents per 100 pounds.

## IMPORTS.

The sugar imported into the United Kingdom increased from 2,600,000,000 pounds in 1883 to 3,500,000,000 in 1903.

In 1883 more than one-half of the total imports consisted of raw cane sugar. In 1903 such sugar represented only 12 per cent of the total supplies. The British colonies alone furnished in 1883 one-fifth of the total sugar imports of the United Kingdom. In 1902 they supplied only 6 per cent, and in 1903 only 4 per cent.

In place of the raw cane sugar formerly imported, refined sugar, mainly from beet-producing countries, is now received. Such sugar in 1883 constituted only 14 per cent of the total imports. In 1903 about 60 per cent of the total receipts consisted of refined sugar. The quantity of raw beet sugar imported has remained almost constant during the last twenty years. In 1883 923,000,000 pounds of such sugar was received, and in 1903, 989,000,000 pounds. (See Table 51.)

TABLE 51.—Imports of sugar into the United Kingdom, 1883–1903.

Calendar year.	Total.	Raw sugar.			Refined sugar.	
		Beet.	Cane.		From beet-growing countries.	From cane-growing countries.
			From British colonies.	From foreign countries.		
	<i>Pounds.</i>	<i>Pounds</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
1883.....	2,648,861,200	923,474,400	541,180,500	816,407,300	352,181,500	15,617,500
1884.....	2,675,293,800	875,360,800	556,077,600	766,301,600	358,170,000	119,383,800
1885.....	2,771,507,700	901,669,000	441,897,800	831,087,800	341,282,100	255,571,000
1886.....	2,520,639,600	747,241,000	363,904,200	695,824,800	554,222,700	159,446,900
1887.....	2,800,747,900	1,020,763,200	356,214,100	640,183,700	696,690,700	86,896,200
1888.....	2,769,664,900	703,593,900	386,068,300	910,384,400	764,968,300	4,660,000
1889.....	2,971,181,600	884,684,000	445,505,400	635,427,100	1,303,612,800	1,952,300
1890.....	2,877,743,800	1,120,516,500	261,466,000	378,374,800	1,084,549,800	32,836,700
1891.....	3,083,872,800	1,019,593,600	264,529,900	530,551,800	1,209,086,100	60,111,400
1892.....	3,014,627,600	953,346,700	301,236,200	570,529,600	1,185,168,200	4,346,900
1893.....	3,089,257,200	959,091,700	290,305,600	546,199,400	1,288,552,200	5,108,300
1894.....	3,164,089,100	867,410,400	367,967,400	366,894,600	1,559,707,300	2,109,400
1895.....	3,489,375,700	1,025,243,100	324,225,800	555,650,800	1,582,382,400	1,873,600
1896.....	3,418,307,700	903,158,800	347,658,000	512,474,900	1,653,792,400	1,223,600
1897.....	3,291,040,100	973,794,100	188,060,700	356,140,300	1,771,454,900	1,590,100
1898.....	3,495,873,800	1,071,370,800	154,994,000	419,240,600	1,848,268,800	1,999,600
1899.....	3,464,258,300	1,052,729,700	181,319,700	235,582,000	1,892,309,200	2,312,400
1900.....	3,638,109,300	1,146,830,300	154,320,200	181,161,900	2,154,526,300	1,270,600
1901.....	3,886,126,800	1,121,057,100	172,995,600	205,307,300	2,380,319,000	447,800
1902.....	3,537,733,900	1,058,516,300	202,401,800	219,889,000	2,055,927,600	999,200
1903.....	3,498,588,600	989,328,000	142,331,600	284,992,400	2,081,880,300	56,300

## PRICES.

With no tax on sugar and no import duty until 1901, prices fell with the increasing surplus production of continental beet sugar and the need of marketing it abroad. The average price of the raw beet sugar imported into the United Kingdom in 1883 was 4.34 cents per pound. The average price for 1902 was 1.56 cents. The price of raw cane sugar fell almost as much, from 4.39 cents in 1883 to 1.91 cents in 1902. The fall in refined sugar prices was even more marked, from 5.91 cents per pound in 1883 to 2.29 cents in 1902. The average prices for 1903 show a slight increase. (See Table 52.) These prices are

TABLE 52.—Average import price of sugar per pound in the United Kingdom, 1883–1903.

Calendar year.	Raw sugar.		Refined sugar.	Calendar year.	Raw sugar.		Refined sugar.
	Beet.	Cane.			Beet.	Cane.	
	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>		<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>
1883.....	4.34	4.39	5.91	1894.....	2.43	2.65	3.37
1884.....	3.08	3.56	4.54	1895.....	2.32	2.24	2.77
1885.....	2.81	3.16	3.94	1896.....	2.08	2.36	2.95
1886.....	2.60	3.01	3.63	1897.....	1.76	1.99	2.56
1887.....	2.56	2.72	3.40	1898.....	2.01	2.22	2.67
1888.....	2.84	3.01	3.81	1899.....	2.16	2.57	2.73
1889.....	3.24	3.48	3.94	1900.....	2.17	2.61	2.79
1890.....	2.66	2.90	3.55	1901.....	1.97	2.37	2.65
1891.....	2.76	2.89	3.59	1902.....	1.56	1.91	2.29
1892.....	2.85	2.86	3.71	1903.....	1.83	2.01	2.33
1893.....	3.12	3.08	3.99				

exclusive of duty. The average prices quoted for British refined sugar by sugar yards are shown in Table 53.

TABLE 53.—Average price per pound of British refined sugar, 1891–1904.

Year ending July 31—	Tate's cubes No. 1.	Year ending July 31—	Tate's cubes No. 1.	Year ending July 31—	Tate's cubes No. 1.
	<i>Cents.</i>		<i>Cents.</i>		<i>Cents.</i>
1891.....	4.30	1896.....	3.75	1901.....	3.77
1892.....	4.48	1897.....	3.33	1902.....	3.86
1893.....	4.67	1898.....	3.23	1903 <sup>a</sup> .....	3.87
1894.....	4.43	1899.....	3.41	1904 <sup>b</sup> .....	4.02
1895.....	3.53	1900.....	3.46		

<sup>a</sup> Thirteen months ending August 31, 1903.<sup>b</sup> Year ending August 31, 1904.

## UNITED STATES.

In spite of its considerable domestic sugar production, the United States is still compelled to import annually a large quantity of foreign sugar. In many years its imports have been even greater than those of the United Kingdom.

During the fiscal year ending June 30, 1904, the sugar imports of the United States amounted to about 4,700,000,000 pounds. This included about 1,000,000,000 pounds imported from Hawaii and Porto Rico and 62,000,000 pounds from the Philippine Islands. Cuba



furnished 2,761,000,000 pounds. In addition to the imports, the domestic sugar industry produced nearly 1,000,000,000 pounds, consisting almost equally of beet and cane sugar.

The tariff act of 1890, which removed the import duty from all raw sugar and reduced the duty on refined to one-half cent per pound, imposed an additional duty of one-tenth cent per pound on sugar above No. 16 Dutch standard in color that received a foreign bounty greater than that paid on lower grade sugar. The rate fixed was probably intended to cover the difference between the German bounty on raw and on refined sugar. Under the act of 1894 the countervailing duty was retained at one-tenth cent per pound, but was extended to all bounty sugar. The act of 1897 contained a general provision that all articles receiving directly or indirectly export bounties from foreign countries should be subject to an additional duty equal to the bounty received. Under this provision the Secretary of the Treasury from time to time fixes the rate of additional duty to be imposed on sugar from various foreign countries.<sup>a</sup> In 1899 a similar provision was inserted in the tariff of British India.

These provisions served to stimulate the importation of cane sugar rather than of beet sugar into the United States and India, and also set a precedent for the imposition of countervailing duties under the Brussels Convention.

The regular duty under the act of 1897 is 1.95 cents per pound on refined sugar and 1.685 cents on sugar not above No. 16 Dutch standard in color, testing 96° by the polariscope. The rate varies 0.035 cent for each degree above or below 96°, with a minimum limit of 0.95 cent on sugar not above 75°.

#### IMPORTS.

During the last twenty years the domestic sugar production of continental United States was more than trebled, but the imports of sugar also increased rapidly. In 1884, 2,800,000,000 pounds of sugar were imported. In 1904 the imports from all sources, including Hawaii and Porto Rico, amounted to 4,700,000,000 pounds. In that year over 99½ per cent of the total sugar imports consisted of raw cane sugar. (See Table 54.<sup>b</sup>)

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<sup>a</sup>The countervailing duty on German raw sugar was fixed at 26 cents per 100 pounds; on Austro-Hungarian at rates varying for different years from 30 to 20 cents; on French at 80 cents, and on Russian at 63 cents. (Treasury Decisions Nos. 18217, 19071, 21274, 22814, 24167.) Only the last of these duties was retained in force as regards sugar produced after August 31, 1903.

In India, after June 6, 1902, Austro-Hungarian and German sugar was subjected to special duties of 94 and 83 cents, respectively, per 100 pounds—intended, apparently, to offset the advantage accruing from the cartels.

<sup>b</sup>Compiled from data in Commerce and Navigation of the United States and Monthly Summary of Commerce and Finance.

TABLE 54.—Imports of sugar into the United States, 1883–1904.

Year ending June 30—	Total.	Raw sugar. <i>a</i>				Refined sugar. <i>b</i>	
		Beet.		Cane.		Pounds.	Per ct.
		Pounds.	Per ct.	Pounds.	Per ct.		
1883.....	2,133,956,284	18,604,979	0.87	2,115,313,505	99.13	37,800	.....
1884.....	2,756,416,896	102,419,837	3.72	2,653,991,647	96.25	905,412	0.03
1885.....	2,717,884,653	273,677,486	10.07	2,444,185,655	89.93	21,512	.....
1886.....	2,689,881,765	236,932,039	8.81	2,452,883,985	91.19	65,741	.....
1887.....	3,136,443,240	233,474,404	7.44	2,902,919,671	92.56	49,165	.....
1888.....	2,700,284,282	61,949,752	2.29	2,638,298,405	97.71	36,125	.....
1889.....	2,762,202,967	243,473,321	8.81	2,518,484,022	91.18	245,624	.01
1890.....	2,934,011,560	601,119,476	20.49	2,332,675,169	79.50	216,915	.01
1891.....	3,479,444,051	658,994,380	18.94	2,820,266,403	81.05	183,268	.01
1892.....	3,556,509,165	293,134,261	8.24	3,248,494,502	91.34	14,880,402	.42
1893.....	3,766,445,347	436,333,843	11.58	3,296,706,423	87.53	33,405,081	.89
1894.....	4,345,193,881	510,350,276	11.74	3,775,878,029	86.90	58,965,576	1.36
1895.....	3,574,510,354	347,376,632	9.72	3,168,781,436	88.65	58,352,286	1.63
1896.....	3,896,338,557	604,686,985	15.52	3,104,187,781	79.67	187,463,791	4.81
1897.....	4,918,905,733	1,865,577,495	37.93	2,854,192,069	58.02	199,136,169	4.05
1898.....	2,689,920,851	140,641,485	5.23	2,448,190,703	91.01	101,088,663	3.76
1899.....	3,980,250,569	723,336,352	18.17	3,194,168,454	80.25	62,745,763	1.58
1900.....	4,018,086,530	701,539,452	17.46	3,305,087,796	82.26	11,459,282	.28
1901.....	c 4,803,088,500	908,683,078	18.92	c 3,784,668,762	78.80	109,736,660	2.28
1902.....	c 3,936,286,281	255,030,219	6.48	c 3,590,163,343	91.21	91,092,719	2.31
1903.....	c 5,217,077,034	87,130,805	1.67	c 5,076,604,049	97.31	53,342,180	1.02
1904.....	c 4,694,347,212	2,414,454	.05	c 4,675,627,813	99.60	16,304,945	.35

*a* Prior to April 1, 1891, not above No. 13 Dutch standard in color; subsequently not above No. 16 Dutch standard. Prior to 1888 the official returns are not classified as beet and cane. The figures here given for beet comprise the imports of raw sugar from countries of continental Europe; the figures for cane, imports from all other countries.

*b* Prior to April 1, 1891, above No. 13 Dutch standard in color; subsequently above No. 16 Dutch standard.

*c* Including, as in earlier years, shipments of raw cane sugar from Porto Rico and Hawaii.

Table 55 shows the relative importance of several leading sources of our sugar supply. Until the outbreak of war Cuba furnished the main part of the sugar imports of the United States. In the fiscal year 1895 Cuba supplied 52 per cent of our total imports of raw sugar. The following year imports from Cuba amounted to only 29 per cent, but that island still furnished more sugar than any other country. In 1897 Germany was the leading source of supply, and during the next three years the Dutch East Indies. Nearly all the imports from that group were furnished by Java. The partial recovery of the Cuban industry brought the imports from that source again to the first rank in 1901. In 1904 Cuba furnished 59 per cent of the total sugar imports. Sugar imported into the United States from Hawaii increased from 5 per cent of the total in 1883 to 16 per cent in 1904.

TABLE 55.—Percentage of raw sugar imported into the United States from leading countries, 1883–1904.

Year ending June 30—	From Cuba (cane).	From Dutch East Indies (cane).	From Hawaii (cane).	From Germany (beet).	From other countries.	Year ending June 30—	From Cuba (cane).	From Dutch East Indies (cane).	From Hawaii (cane).	From Germany (beet).	From other countries.
1883.....	53.41	0.22	5.35	0.76	40.26	1894.....	49.64	6.72	7.58	8.27	27.79
1884.....	43.23	.23	4.54	2.66	49.34	1895.....	52.49	7.98	7.80	8.59	23.14
1885.....	41.03	.28	6.24	8.55	43.90	1896.....	29.47	15.31	9.50	12.13	33.59
1886.....	45.00	.56	7.12	7.56	39.76	1897.....	12.21	13.44	9.14	32.02	33.19
1887.....	44.47	.56	6.96	7.03	40.98	1898.....	17.00	23.75	19.30	5.33	34.62
1888.....	44.78	.23	8.46	1.91	44.62	1899.....	16.94	25.18	11.80	16.72	29.36
1889.....	37.37	3.11	8.81	7.36	43.35	1900.....	17.61	29.01	12.60	14.70	26.08
1890.....	35.49	3.82	7.65	17.45	35.59	1901.....	23.42	16.58	14.72	14.70	30.58
1891.....	41.12	3.92	8.97	13.19	32.80	1902.....	25.60	16.56	18.74	5.27	33.83
1892.....	56.01	3.98	7.42	4.89	27.70	1903.....	46.40	17.27	15.01	1.45	19.87
1893.....	49.39	4.92	7.73	8.72	29.24	1904.....	59.02	9.19	15.74	.05	16.00

## DOMESTIC SUGAR INDUSTRY.

The domestic cane-sugar and beet-sugar industries of the United States now produce about one billion pounds of sugar annually. Of this, about 40 per cent during the three years 1901-2 to 1903-4 consisted of beet sugar and 60 per cent of cane sugar.

## LOCALIZATION OF CANE AND BEET CULTURE.

The accompanying map (Plate IV) shows the relative area devoted to sugar beets and to sugar cane throughout the United States. It will be seen that sugar beets are grown in the north and west of the country, while sugar cane is confined to the Southern States. Practically all of the cane used for sugar making is grown in Louisiana and in certain restricted areas of Texas and Florida. Throughout the rest of the Southern States cane is used only for the manufacture of sirup. The map is constructed from data given in the Twelfth Census of the United States.

The sugar industry of Louisiana is located almost entirely in the southern third of the State. The cane lands, consisting mainly of rich alluvial soil, follow the course of the Mississippi River and also extend westward, including the low, rich lands of St. Mary and Terrebonne parishes. In the parish of Terrebonne more than one-half of the entire area of improved land was devoted to sugar cane in 1899, and in St. Mary 48 per cent of the improved land. In seven other parishes sugar cane occupied more than one-fourth of the improved land. These percentages bring out very clearly the extent to which southern Louisiana is occupied in cane cultivation.

Beet culture in the United States has been rapidly extended during the last decade. In 1899, 110,000 acres were devoted to beets, and in many sections the importance of the crop was considerable. In Eddy County, N. Mex., nearly 15 per cent of the improved farm land was devoted to beet culture, and in Bay County, Mich., about 13 per cent. Beets occupied more than 6 per cent of the improved land in Ventura County, Cal., and in Spokane County, Wash. Since 1899 the beet area of the United States has more than doubled, reaching 292,000 acres in 1903.

## ACREAGE AND PRODUCTION OF SUGAR CANE.

Prior to 1899 the census failed to show the amount of cane harvested. Its statistics were confined to the area of the crop and the sugar production.

Statistics for the Twelfth Census show a total area of 387,000 acres devoted to cane culture, of which 277,000 acres were located in Louisiana. The cane harvested in the whole United States amounted to 4,000,000 short tons, of which 3,000,000 were grown in Louisiana. The returns indicate an average yield of somewhat less than 11 tons

per acre for the whole United States and about  $11\frac{1}{3}$  tons for Louisiana. The cane sold brought an average price of \$3.40 per ton for Louisiana and \$3.45 for the entire country. (See Table 56.)

TABLE 56.—*Acreage and production of sugar cane in the United States<sup>a</sup> in 1879, 1889, and 1899.*

State or Territory.	1879, area.	1889, area.	1899.			
			Area.	Cane har- vested.	Average yield per acre.	Average farm value per ton.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Dollars.</i>
Louisiana .....	181,592	193,694	276,966	3,137,338	11.33	3.40
Georgia .....	15,053	20,238	26,056	284,410	10.92	3.86
Alabama .....	6,627	19,415	32,871	267,857	8.15	3.82
Texas .....	10,224	16,284	17,824	170,485	9.56	4.02
Florida .....	7,938	9,345	13,800	140,729	10.20	4.49
Mississippi .....	4,555	12,694	11,552	122,384	10.59	4.04
South Carolina .....	1,787	3,305	7,342	73,702	10.04	3.79
Arkansas .....			460	4,097	8.91	3.25
Indian Territory .....			35	550	15.71	3.87
Arizona .....			50	240	4.80	6.20
New Mexico .....			5	211	42.20	3.69
North Carolina .....			25	199	7.96	4.91
Total .....	227,776	274,975	386,986	4,202,202	10.86	3.45

<sup>a</sup> Exclusive of Hawaii.

#### CANE-SUGAR PRODUCTION.

The last three censuses show a regular increase in the production of cane sugar in the United States. The total production in 1879-80 was 215,000,000 pounds; in 1889-90, 301,000,000 pounds; and in 1899-1900, 323,000,000 pounds. (See Table 57.) The figures for the last year fail to show the real progress of the industry. The crop of 1899 was much below the average. In Louisiana alone the sugar production of 1899-1900 fell more than 200,000,000 pounds below the production of the preceding year, and in Texas was less than one-fourth of the output for 1898-99.

TABLE 57.—*Production of cane sugar, molasses, and sirup in the United States,<sup>a</sup> 1879-80, 1889-90, and 1899-1900.*

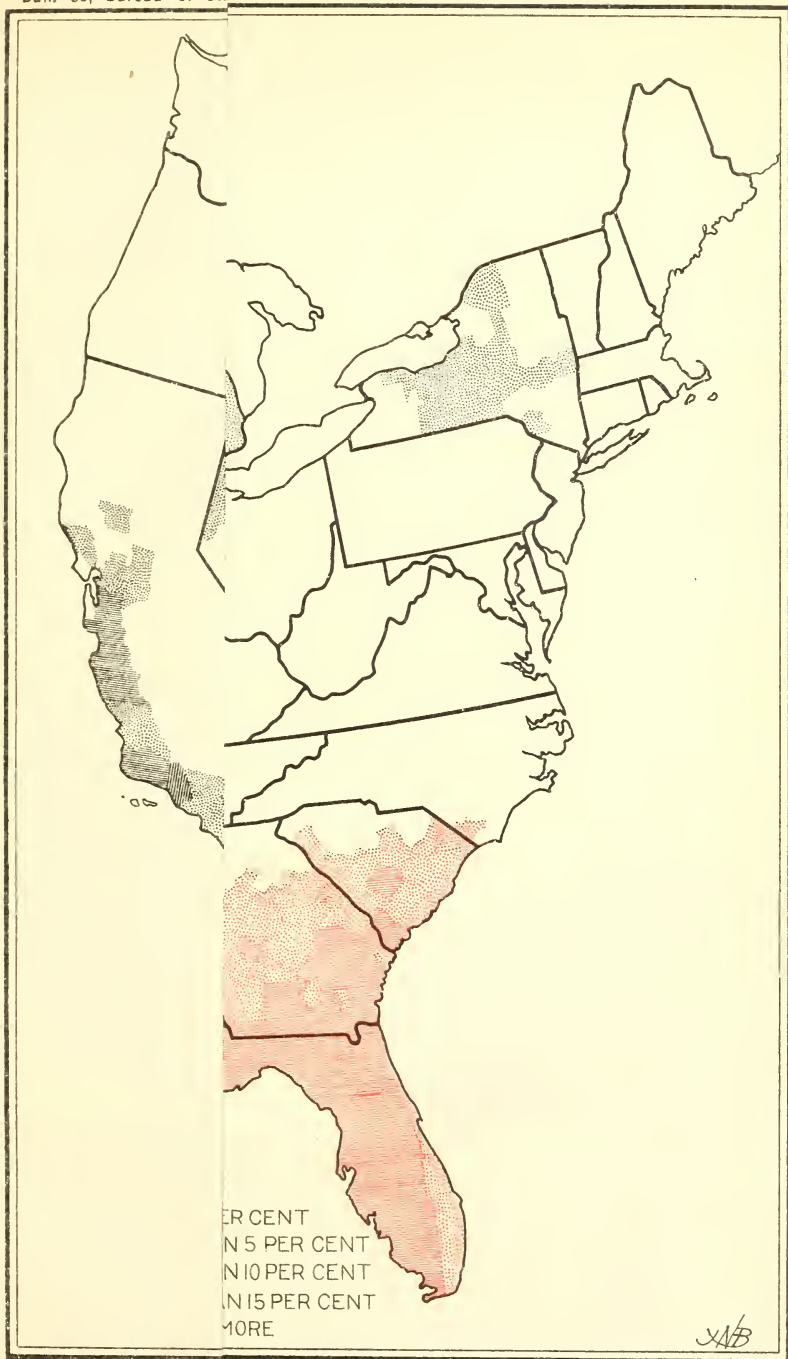
State or Terri- tory.	1879-80.		1889-90.		1899-1900.			
	Sugar.	Molasses.	Sugar.	Molasses.	Cane crushed.	Sugar.	Molasses.	Sirup.
	<i>Pounds.</i>	<i>Gallons.</i>	<i>Pounds.</i>	<i>Gallons.</i>	<i>Short tons.</i>	<i>Pounds.</i>	<i>Gallons.</i>	<i>Gallons.</i>
Louisiana .....	206,047,200	11,696,248	292,124,050	11,341,081	62,123,354	319,166,396	11,703,877	2,480,856
Texas .....	5,941,200	810,605	5,482,050	2,159,339	44,431	2,789,250	98,950	1,888,637
Florida .....	1,527,600	1,029,868	1,692,015	1,441,744	81,372	284,300		1,687,452
Georgia .....	721,200	1,565,784	1,307,625	3,223,194	161,318	226,730		3,226,367
South Carolina .....	274,800	138,941	219,980	386,615	40,749	49,590		805,064
Mississippi .....	21,600	536,625	67,860	1,524,024	70,661	18,930		1,413,219
Alabama .....	112,800	795,199	390,835	2,333,231	133,622	13,765		2,672,438
Arkansas .....					2,241	50		44,819
North Carolina .....					98			1,957
Arizona .....					100			438
Indian Territory .....					c 229			
Total .....	214,646,400	16,573,273	301,284,395	25,409,228	2,661,175	322,549,011	11,802,827	13,221,247

<sup>a</sup> Exclusive of Hawaii.

<sup>b</sup> Including for Louisiana, but not for other States, the quantity of cane sold.

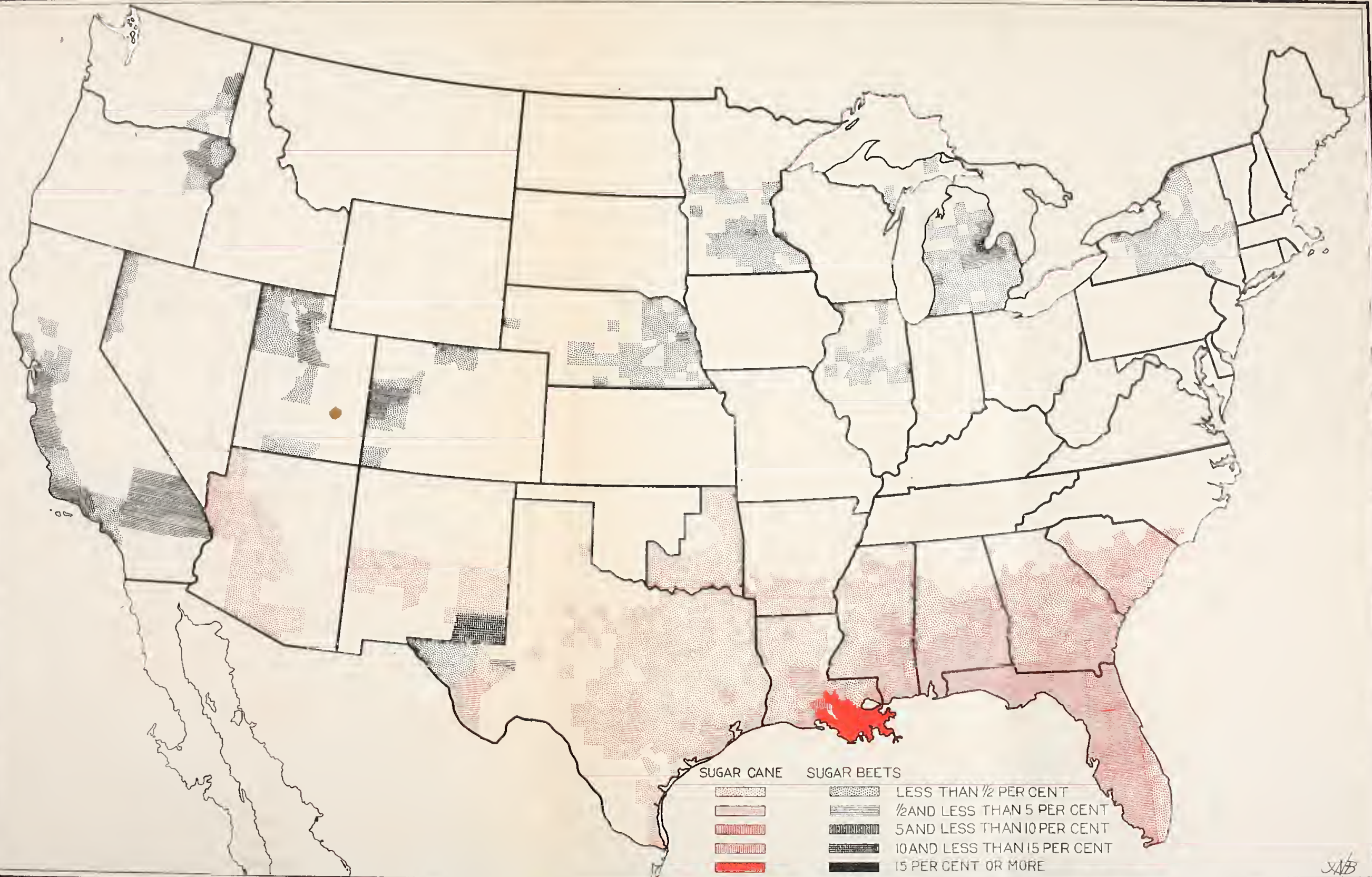
<sup>c</sup> No corresponding production of sugar, molasses, or sirup was reported.











PROPORTION OF THE TOTAL IMPROVED LAND IN THE UNITED STATES DEVOTED TO SUGAR CANE AND TO SUGAR BEETS, 1899





Outside of Louisiana the production of sugar as compared with sirup is small. With the change from open-kettle to vacuum-pan production, the quality of the by-product—molasses—has greatly deteriorated on account of the much larger extraction of saccharine matter in the form of sugar. This change has opened up a field for the direct reduction of sugar cane to sirup.

Practically one-third of the entire cane harvested in Louisiana and in the other southern States must be reserved for planting. Only two-thirds of the crop is consequently available for sugar making.

## SUGAR PRODUCTION IN LOUISIANA.

Statistics covering the Louisiana sugar industry have been published annually by Bouchereau since 1868–69. Table 58 has been compiled from those reports, supplemented by data from Willett & Gray for 1902–3 and 1903–4. The acreage statistics in that table refer to the area on which the cane crushed was harvested, and are consequently about one-third less than the total area devoted to cane, which is shown in Table 56.

TABLE 58.—*Production of sugar in Louisiana, 1884–85 to 1903–4.*

Crop year.	Area. <sup>a</sup>	Cane crushed.	Sugar produced.	Molasses produced.	Average yield of cane per acre.	Average production of sugar.		
						Per ton of cane.	Per cent of cane.	Per acre. <sup>a</sup>
	<i>Acres.</i>	<i>Short tons.</i>	<i>Pounds.</i>	<i>Gallons.</i>	<i>Short tons.</i>	<i>Pounds.</i>		<i>Pounds.</i>
1884–85.....	118,656	2,017,152	211,402,963	11,761,608	17	105	5.24	1,782
1885–86.....	130,330	3,388,580	286,626,486	17,863,732	26	85	4.23	2,199
1886–87.....	103,979	1,455,706	181,123,872	10,254,894	14	124	6.22	1,742
1887–88.....	130,557	3,133,368	353,855,877	21,980,241	24	113	5.65	2,710
1888–89.....	133,384	2,584,982	324,526,781	15,228,580	19	126	6.28	2,433
1889–90.....	121,991	2,195,838	287,490,271	18,431,988	18	131	6.55	2,357
1890–91.....	147,288	3,976,776	483,489,856	23,152,104	27	122	6.08	3,283
1891–92.....	174,560	2,792,960	360,499,307	16,429,868	16	129	6.46	2,065
1892–93.....	226,244	3,477,218	487,255,926	18,151,991	<sup>b</sup> 15	140	7.01	2,154
1893–94.....	204,990	4,119,130	595,473,374	18,469,529	20	145	7.23	2,905
1894–95.....	246,953	4,914,404	710,827,438	28,334,513	20	145	7.23	2,878
1895–96.....	185,075	3,648,230	532,494,652	21,663,411	20	146	7.30	2,877
1896–97.....	203,258	4,065,160	631,699,561	20,820,130	20	155	7.77	3,108
1897–98.....	190,615	4,384,151	695,401,878	22,241,510	23	159	7.93	3,648
1898–99.....	207,674	4,361,177	549,947,417	24,952,188	21	126	6.31	2,648
1899–1900.....	133,634	2,138,144	329,647,746	13,628,840	16	154	7.71	2,467
1900–1901.....	203,612	4,560,909	605,557,690	31,419,688	22	133	6.64	2,974
1901–2.....	239,450	4,549,550	720,554,948	23,727,735	19	158	7.92	3,009
1902–3.....	(c)	(c)	672,000,000	(c)	(c)	(c)	(c)	(c)
1903–4.....	(c)	(c)	481,600,000	(c)	(c)	(c)	(c)	(c)

<sup>a</sup> Statistics relate to the area from which the cane crushed was harvested.

<sup>b</sup> Stated by Bouchereau as 18 short tons.

<sup>c</sup> Not stated.

## BEET-SUGAR INDUSTRY.

The beet-sugar industry is of recent introduction into the United States. In no year prior to 1891–92 did the total output of beet sugar in the United States amount to as much as 10,000,000 pounds. Ten years later the production reached 365,000,000 pounds, and in 1903–4, 466,000,000 pounds. (See Table 59.<sup>a</sup>) During the last twelve years

<sup>a</sup> Statistics for 1891–92 to 1893–94 compiled from the Reports of the Commissioner of Internal Revenue; for 1897–98, from Special Report of the Department of Agriculture; for 1899–1900, from the Twelfth Census; for other years, from Willett & Gray, March 2, May 25, July 6, 1899; March 22, June 14, 1900; March 7, 1901; March 27, 1902; March 26, 1903; March 24, 1904.

the beet-sugar output increased to nearly forty times its amount in 1891-92. The industry was first introduced into California. Nebraska and Utah were the next States to take up the production of beet sugar. Beet culture was not introduced into Michigan until 1898-99. In 1903-4, 53 factories, located in 12 States, were in operation. These factories worked 2,023,000 short tons of beets, grown on 292,000 acres. Michigan contributed the largest crop of beets, although California produced the largest quantity of sugar.

TABLE 59.—*Production of beet sugar in the United States, 1891-92 to 1903-4.*

Factory year.	Factories.	Area.	Beets used.	Average yield per acre.	Sugar produced. <sup>a</sup>	Average extraction of raw sugar.		
						Per ton of beets.	Per cent of beets.	Per acre.
	<i>Number.</i>	<i>Acres.</i>	<i>Short tons.</i>	<i>Short tons.</i>	<i>Pounds.</i>	<i>Pounds.</i>		<i>Pounds.</i>
1891-92.....	6	7,155	72,530	10.14	12,004,838	184	9.20	1,864
1892-93.....	6	13,128	128,887	9.82	27,083,288	233	11.67	2,292
1893-94.....	6	19,645	195,896	9.97	45,191,296	256	12.82	2,556
1894-95.....	5	19,538	(b)	(b)	45,006,000	(b)	(b)	2,559
1895-96.....	6	22,948	(b)	(b)	65,453,000	(b)	(b)	3,169
1896-97.....	7	57,239	(b)	(b)	84,081,000	(b)	(b)	1,632
1897-98.....	9	41,272	389,635	9.44	90,491,670	258	12.90	2,436
1898-99.....	15	37,400	(b)	(b)	72,735,000	(b)	(b)	2,161
1899-1900.....	31	135,305	794,658	5.87	163,458,075	229	11.43	1,342
1900-1901.....	34	132,000	811,654	6.15	172,164,000	236	11.78	1,449
1901-2.....	39	194,725	1,704,595	8.75	365,402,000	238	11.91	2,085
1902-3.....	44	259,513	1,888,665	7.28	437,837,000	258	12.88	1,875
1903-4.....	53	292,295	2,022,839	6.92	466,222,000	256	12.80	1,772

<sup>a</sup>The bulk of the sugar produced is refined. For calculating the average extraction the figures here given have been reduced to terms of raw sugar on the assumption that 90 pounds of refined is equivalent to 100 pounds of raw.

<sup>b</sup>Not stated.

The average yield of beets per acre in the United States was about 7 short tons. In Utah, where the crop was grown almost exclusively under irrigation, the average yield was 10½ short tons per acre, and in California nearly 9 short tons. For the country as a whole, the average yield of beets per acre apparently shows a decline since 1891-92. This is due to the introduction of beet culture into States where the methods of culture are less intensive than those in California. In 1891-92, when the average yield per acre was 10 short tons, more than two-thirds of the entire sugar output was produced in California. While there has been some decrease in the average yield of beets per acre, there has been a noticeable improvement in the average sugar extraction. In 1891-92 the average extraction was 9.20 per cent; in 1903-4, 12.80 per cent. In California the average extraction was considerably higher—13.86 per cent of the beets worked in 1903-4. (See Table 60.<sup>a</sup>)

<sup>a</sup> Willett & Gray, March 24, 1904.

TABLE No. 60.—*Production of beet sugar in the United States, 1903-4, by States.*

States.	Facto- ries.	Area.	Beets used.	Average yield per acre.	Sugar pro- duced.	Average extraction of raw sugar.		
						Per ton of beets.	Per cent of beets.	Per acre.
	No.	Acres.	Short tons.	Short tons.	Pounds.	Pounds.		Pounds.
California.....	7	62,195	544,251	8.75	135,762,000	277	13.86	2,425
Michigan.....	20	117,100	581,059	4.96	127,823,000	244	12.22	1,213
Colorado.....	8	52,300	410,414	7.85	88,628,000	240	12.00	1,883
Utah.....	7	18,700	195,810	10.47	46,301,000	263	13.14	2,751
Nebraska.....	3	11,400	76,642	6.72	19,418,000	282	14.08	1,893
Wisconsin.....	1	5,800	51,000	8.79	11,001,000	240	11.98	2,107
New York.....	2	7,000	45,130	6.45	10,033,000	247	12.35	1,593
Idaho.....	1	5,300	38,001	7.17	7,999,000	234	11.69	1,677
Minnesota.....	1	3,800	30,000	7.89	7,000,000	259	12.96	2,047
Washington.....	1	4,400	22,177	5.04	4,957,000	248	12.42	1,252
Ohio.....	1	2,500	17,000	6.80	4,500,000	294	14.71	2,000
Oregon.....	1	1,800	11,355	6.31	2,800,000	274	13.70	1,728
Total.....	53	292,295	2,022,839	6.92	466,222,000	256	12.80	1,772

## SUGAR SITUATION IN 1904.

The continental beet sugar industry enjoyed government aid for so many years that the question naturally arises, Will the industry be seriously impaired by the recent withdrawal of bounties? Considerable time must necessarily elapse before a definite answer can be given.

Under the restrictions and bounties of the past, admirable methods of culture and of extraction were developed. The freer competition of the present will show whether the improved methods evolved are sufficient to offset whatever peculiar natural advantages the Tropics possess.

The most obvious effects of the sugar legislation prior to the Brussels Convention were undoubtedly the artificially high prices obtained in the countries of production and the artificially low prices prevailing in foreign markets. While the average price of refined sugar during the year ending August 31, 1903, was less than 4 cents per pound in the United Kingdom, and only  $4\frac{1}{2}$  cents per pound in the United States, the price in the continental sugar-producing countries varied from  $6\frac{1}{4}$  cents per pound in Germany to over 8 cents per pound in France. But at the same time that the German consumer of sugar was thus paying over 6 cents per pound for his supplies German refined sugar when shipped abroad brought the exporter only 2 cents. Of necessity the exports were increasing with far greater rapidity than the domestic consumption.

The Brussels Convention materially altered the situation. The bounties, which were partly responsible for the low export prices, were abolished, and in several cases the excise was considerably reduced, although no change in the strictly internal regulations was required by the convention.

In consequence domestic prices were considerably lowered and export prices slightly raised. Sugar now brings only about 4 cents per pound in Germany, 5 cents in France, and 6 cents in Austria. The reduction in domestic prices was in some cases greater than the decrease in the excise. Higher prices had been obtained partly by the action of strong national combinations of sugar producers. In Austria-Hungary, with no reduction whatever in the excise, prices fell fully  $1\frac{1}{2}$  cents per pound when the cartel was dissolved.

While Russia was not a party to the Brussels Convention, its sugar legislation was also considerably modified in 1903. Previously the effect of the Russian law was to encourage exportation by apportioning privileges in the domestic market according to total output. By amending this provision, the special incentive to producing for shipment abroad was lessened. The signatory powers, as well as the United States and British India, now impose a special countervailing duty on Russian sugar imported, while the United Kingdom entirely prohibits its importation.

The overproduction of previous years and the accumulation of enormous stocks rendered much more difficult the transition to the new conditions required by the convention. The acreage of sugar beets in Europe was materially decreased, and an unsuccessful attempt was made to restrict production through a voluntary agreement between the sugar producers of various countries. The transition was effected with little or no increase in sugar stocks.

Production for the home market will undoubtedly become relatively more important. Even under the Brussels Convention a protective surtax of half a cent per pound may be placed on imported sugar. The lower inland prices that now prevail will encourage increased domestic consumption, while the abolition of export bounties takes away one incentive to excessive shipments abroad. Exportation will nevertheless continue on a large scale; for it will doubtless be more profitable to sell part of the output abroad, even at lower prices, than to limit production strictly to local requirements. But legislative aid will no longer recoup producers, if by excessive output world prices are reduced more than the expenses of production.

The relative increase in local consumption as compared with shipment abroad is clearly indicated in Table 61.<sup>a</sup> During 1903-4, the

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<sup>a</sup>Compiled from *Monatliche Nachweise über den auswärtigen Handel des deutschen Zollgebiets*, *Statistische Übersichten betreffend den auswärtigen Handel des österreichisch-ungarischen Zollgebiets*, *Statistik des auswärtigen Handels des österr.-ungar. Zollgebiets*, *Documents statistiques sur le commerce de la France*, and *Deutsche Zuckerindustrie*, 1904, pp. 1557-1558, statistical part, p. 521, *Journal des fabricants de sucre*, September 21, 1904.



TABLE 61.—*Sugar production, consumption, and exports of Germany, Austria-Hungary, and France for the twelve months ending August 31, 1903 and 1904.*

Country.	Production.	Consumption. <sup>a</sup>	Exports. <sup>a</sup>
	<i>Pounds.<sup>b</sup></i>	<i>Pounds.<sup>b</sup></i>	<i>Pounds.<sup>b</sup></i>
Germany:			
1902-3.....	3,869,947,600	1,631,484,900	2,328,977,100
1903-4.....	4,253,588,100	2,478,160,200	1,946,264,100
Austria-Hungary:			
1902-3.....	2,303,344,000	841,879,000	1,743,035,500
1903-4.....	2,545,411,000	1,109,632,000	1,364,404,700
France:			
1902-3.....	1,815,812,000	909,076,000	513,725,000
1903-4.....	1,751,401,000	1,712,313,000	574,018,000

<sup>a</sup> The combined consumption and exports may exceed the total production for any year by the imports and the decrease in stocks.

<sup>b</sup> In terms of raw sugar.

first year after the Brussels Convention went into effect, 58 per cent of the sugar output of Germany was consumed within the Empire, while during the preceding year only 42 per cent was consumed locally. On the other hand, the proportion of the output exported decreased from 60 per cent in 1902-3 to 46 per cent in 1903-4. In France large colonial receipts, together with accumulated stocks, made it possible for the exports to increase notwithstanding an enlarged domestic demand almost equal to the entire domestic output. The statistics given may slightly exaggerate the real increase in consumption and decline in exportation, for the anticipated changes in legislation on September 1, 1903, encouraged producers to delay entering sugar for consumption until after that date and to clear sugar for exportation before that date.

More equal conditions of competition in the world's market between beet and cane sugar and increased consumption of sugar in continental Europe appear to be the most important features in the present sugar situation.

The new sugar year opens with prospects for a reduced beet sugar output in Europe that will probably wipe out the accumulated stocks and perhaps necessitate a considerable decline in consumption. General drought throughout the beet-growing sections, together with a reduction of 7 per cent in the plantings, caused a falling off in the beet crop estimated at 20 per cent as compared with 1903.<sup>a</sup> The International Association for Sugar Statistics estimates the beet-sugar production of Europe for 1904-5 at only 4,450,000 long tons—less than that for any other year since 1895-96. Such an estimate, based on returns from manufacturers, doubtless somewhat exaggerates the decline. Licht's estimate is considerably higher—4,870,000 long tons for 1904-5, as compared with 5,770,000 long tons for 1904, a decrease of

<sup>a</sup> Deutsche Zuckerindustrie, 1904, p. 1830; Journal des fabricants de sucre, November 2 and 9, 1904; Willett & Gray, November 23, 1904.

900,000 long tons, or over 15 per cent. An increase in the cane sugar production estimated at 400,000 long tons will partly offset this decline, and, if fully realized, will raise the share of cane sugar in the commercial sugar production of the world from 42 per cent in 1903-4 to about 48 per cent in 1904-5. If the actual decline in the European output is as large as that anticipated, the consequent high prices may check the increasing per capita consumption of sugar. Still, such an effect can scarcely prove permanent, for high prices resulting from a bad crop are not only temporary but constitute an incentive to larger crops and hence lower prices in the future.

Perhaps the chief objection to the abolition of bounties was the difficulty anticipated in marketing the accumulated stocks and the production above domestic requirements. For the year 1904-5, at least, this difficulty will be removed, and in the future, with no special incentive to production for shipment abroad, it will doubtless prove more feasible than in the past to accommodate the output to the actual demand.





